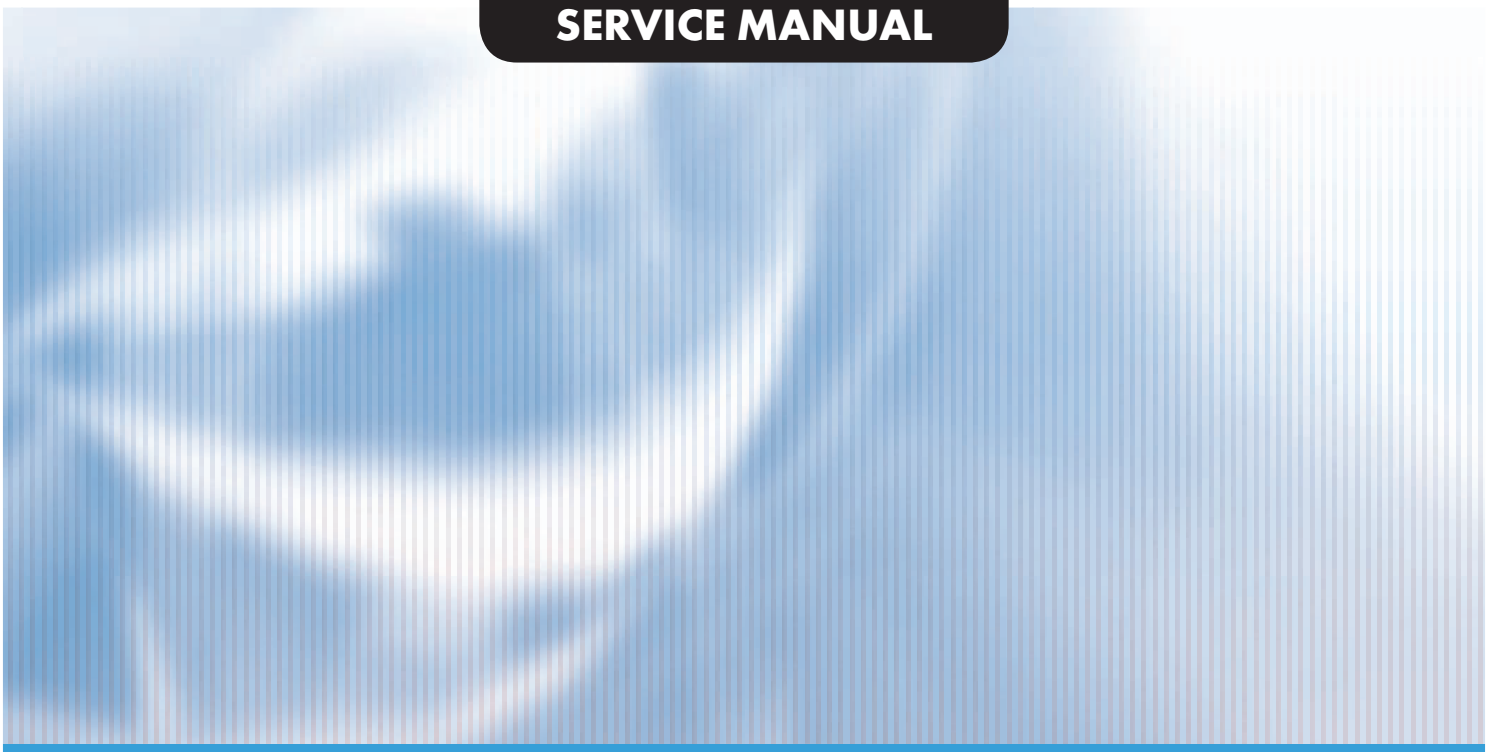
SERVICE MANUAL



# CONDENSING UNIT

## ASE-18AH, ASE-24AH, ASE-36AH, ASE-48AH, ASE-60AH

sinclair

AIR CONDITIONING

## Outdoor Units - appearance

18,000Btu/h

30,000~36,000Btu/h

24,000Btu/h

48,000Btu/h-60,000Btu/h

# Model Names of Outdoor Units

| Universal Outdoor unit Model | Compressor type | Compressor Brand |
|---|---|---|
| *Heat Pump* | | |
| ASE-18AH | Rotary | GMCC |
| ASE-24AH | Rotary | GMCC |
| ASE-36AH | SCROLL | SANYO |
| ASE-48AH | SCROLL | SANYO |
| ASE-60AH | SCROLL | SANYO |

# Features

High quality coils:

The coil is constructed of advanced inner grooved copper tube and aluminum fins.

Anti-rust, 500 hours salt spray test.

Low operation sound level: Well-known stable and quiet running fan motor.

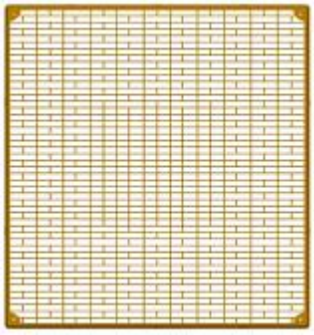
Well-known compressor.

Compact design: Smaller dimension and larger stuffing capacity.

Universal outdoor unit design.

Optional air outlet grille: plastic type and wire type.

Wire type



Plastic type

Plastic type

Optional low temperature cooling module.

R410A environment friendly refrigerant.

# Outdoor Units

1. Specifications ..... 100

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8. Troubleshooting..... 121

| Model | | | ASE-18AH | ASE-24AH |
|---|---|---|---|---|
| Factory model | | | CE-KFR53W/N1-150 | CE-KFR71W/N1-210 |
| Code | | | 220037802190 | 220075301210 |
| Power supply | | V-ph-Hz | 220~240-1-50 | 220~240-1-50 |
| Max. input consumption | | W | 2950 | 3450 |
| Max. input current | | A | 15 | 18 |
| Compressor | Model | | PA225X2CS-4KU1 | PA290X3CS-4MU1 |
| | Type | | Rotary | Rotary |
| | Brand | | GMCC | GMCC |
| | Capacity | Btu/h | 18493/18698 | 24498 |
| | Input | W | 1855/1940 | 2430 |
| | Rated current(RLA) | A | 8.7/8.7 | 11.4 |
| | Locked rotor Amp(LRA) | A | 36.8 | 61 |
| | Thermal protector | | Internal | Internal |
| | Capacitor | μF | 50μF/440V-450V | 50μF/440V-450V |
| | Refrigerant oil | ml | ESTER OIL VG74 750 | ESTER OIL VG74/950 |
| Outdoor fan motor | Model | | YDK48-6H(A) | YDK100-6D |
| | Qty | | 1 | 1 |
| | Input | W | 110 | 168.7 |
| | Capacitor | μF | 3μF/450V | 5μF/450V |
| | Speed | r/min | 890 | 900 |
| Outdoor coil | Number of rows | | 2 | 2 |
| | Tube pitch(a)× row pitch(b) | mm | 21x13.37 | 21x13.37 |
| | Fin spacing | mm | 1.4 | 1.4 |
| | Fin type | | Hydrophilic aluminium | Hydrophilic aluminium |
| | Tube outside dia.and type | mm | φ7, Inner grooved copper tube | φ7, Inner grooved copper tube |
| | Coil length × height × width | mm | 658x546x26.74 | 785x651x26.74 |
| | Number of circuits | | 4 | 4 |
| Outdoor air flow | | $m^3/h$ | 2439 | 3200 |
| Outdoor noise level (sound pressure) | | dB(A) | 54 | 55 |
| Outdoor unit | Dimension(W×H×D) | mm | 760x590x285 | 845×695×324 |
| | Packing (W×H×D) | mm | 887×645×355 | 965×755×395 |
| | Net/Gross weight | kg | 39/42 | 53/57 |
| Refrigerant | Type | | R410a | R410a |
| | Charged volume | g | 1400 | 1900 |
| Throttle type | | | Capillary | Capillary |
| Design pressure | | MPa | 4.2/1.5 | 4.2/1.5 |
| Refrigerant piping | Liquid side/ Gas side | mm | φ6.4/φ12.7 | φ9.5/φ15.9 |
| | Max. pipe length | m | 25 | 25 |
| | Max. difference in level | m | 15 | 15 |
| Ambient temp. | | ℃ | cooling:18~43; heating:-7~24 | cooling: 18~43; heating:-7~24 |

**Notes**: 1. Nominal cooling capacities are based on the following conditions:
Indoor temp: 27°CDB, 19°CWB; Outdoor temp: 35°CDB;
2. Nominal heating capacities are based on the following conditions:
Indoor temp: 20°CDB; Outdoor temp: 7°CDB, 6°CWB;
3. Actual noise level may differ, depending on the room structure, etc, since these noise values are from an anechoic room.

| Model | | | ASE-36AH |
|---|---|---|---|
| Factory model | | | CE-KFR105W/SN1-520 |
| Code | | | 220075500682 |
| Power supply | | V-ph-Hz | 380~415-3-50 |
| Max. input consumption | | W | 4950 |
| Max. input current | | A | 10 |
| Compressor | Model | | C-SBN303H8D |
| | Type | | SCROLL |
| | Brand | | SANYO |
| | Capacity | Btu/h | 33438 |
| | Input | W | 3650 |
| | Rated current(RLA) | A | 6.58 |
| | Locked rotor Amp(LRA) | A | 48 |
| | Thermal protector | | Internal |
| | Capacitor | μF | -- |
| | Refrigerant oil | ml | FV68S/1700 |
| Outdoor fan motor | Model | | YDK190-6D |
| | Qty | | 1 |
| | Input | W | 290 |
| | Capacitor | μF | 10μF/450V |
| | Speed | r/min | 840 |
| Outdoor coil | Number of rows | | 2 |
| | Tube pitch(a)× row pitch(b) | mm | 21x13.37 |
| | Fin spacing | mm | 1.4 |
| | Fin type | | Hydrophilic aluminium |
| | Tube outside dia.and type | mm | φ7, Inner grooved copper tube |
| | Coil length × height × width | mm | 890x903x26.74 |
| | Number of circuits | | 7 |
| Outdoor air flow | | $m^3/h$ | 5000 |
| Outdoor noise level (sound pressure) | | dB(A) | 57 |
| Outdoor unit | Dimension(W×H×D) | mm | 990×966×354 |
| | Packing (W×H×D) | mm | 1120×1100×435 |
| | Net/Gross weight | kg | 92/96 |
| Refrigerant | Type | | R410a |
| | Charged volume | g | 2900 |
| Throttle type | | | capillary |
| Design pressure | | MPa | 4.2/1.5 |
| Refrigerant piping | Liquid side/ Gas side | mm | φ12.7/φ19 |
| | Max. pipe length | m | 30 |
| | Max. difference in level | m | 20 |
| Ambient temp. | | ℃ | cooling: 18~43; heating:-7~24 |

**Notes**: 1. Nominal cooling capacities are based on the following conditions:
Indoor temp: 27°CDB, 19°CWB; Outdoor temp: 35°CDB;

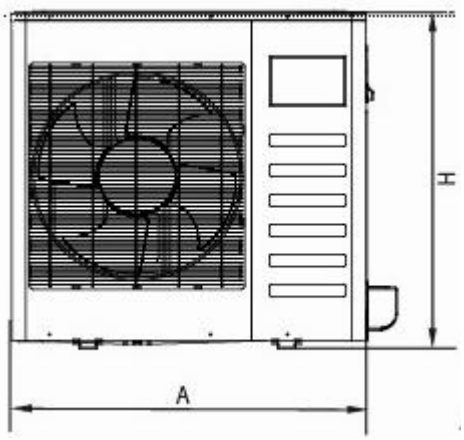
2. Nominal heating capacities are based on the following conditions:
Indoor temp: 20°CDB; Outdoor temp: 7°CDB, 6°CWB;

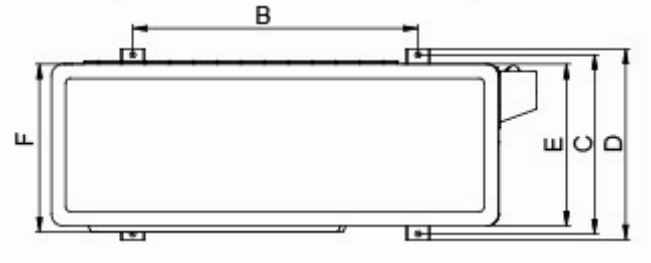
3. Actual noise level may differ, depending on the room structure, etc, since these noise values are from an anechoic room.

| Model | | | ASE-48AH | **ASE-60AH** |
|---|---|---|---|---|
| Factory model | | | CE-KFR140W/SN1-590T[J] | CE-KFR160W/SN1-590T |
| Code | | | 220075701250 | 220075800650 |
| Power supply | | V-ph-Hz | 380~415-3-50 | 380~415-3-50 |
| Max. input consumption | | W | 6300 | 7500 |
| Max. input current | | A | 10.5 | 12.6 |
| Compressor | Model | | C-SBN373H8D | C-SBN453H8D |
| | Type | | Scroll | Scroll |
| | Brand | | Sanyo | Sanyo |
| | Capacity | Btu/h | 48109 | 55956.8 |
| | Input | W | 4750 | 5750 |
| | Rated current(RLA) | A | 8.22 | 9.77 |
| | Locked rotor Amp(LRA) | A | 66 | 67 |
| | Thermal protector | | Internal | Internal |
| | Capacitor | μF | -- | --- |
| | Refrigerant oil | ml | FV68S,1700 | FV68S, 1700 |
| Outdoor fan motor | Model | | YDK65-6-1+YDK65-6F-1 | YDK65-6+YDK65-6F |
| | Qty | | 2 | 2 |
| | Input | W | 171×2 | 148+140 |
| | Capacitor | μF | (4μF/450V)×2 | (3.5μF/450V)×2 |
| | Speed | r/min | 825 | 800 |
| Outdoor coil | Number of rows | | 2 | 2 |
| | Tube pitch(a)× row pitch(b) | mm | 21×13.37 | 22×19.05 |
| | Fin spacing | mm | 1.4 | 1.6 |
| | Fin type | | Hydrophilic aluminium | Hydrophilic aluminium |
| | Tube outside dia. and type | mm | φ7 Inner grooved copper tube | φ7.94 Inner grooved copper tube |
| | Coil length × height × width | mm | 840×1113×26.74 | 837×1100×38.1 |
| | Number of circuits | | 4 | 8 |
| Outdoor air flow | | $m^3/h$ | 6800 | 6850 |
| Outdoor noise level (sound pressure) | | dB(A) | 59 | 59 |
| Outdoor unit | Dimension(W×H×D) | mm | 900×1167×340 | 900×1167×340 |
| | Packing (W×H×D) | mm | 1032×1307×443 | 1032×1307×443 |
| | Net/Gross weight | kg | 110/115 | 106/111 |
| Refrigerant | Type | | R410a | R410A |
| | Charged volume | g | 3250 | 3200 |
| Throttle type | | | capillary | capillary |
| Design pressure | | MPa | 4.2/1.5 | 4.2/1.5 |
| Refrigerant piping | Liquid side/ Gas side | mm | φ12.7/φ19 | φ12.7/φ19 |
| | Max. pipe length | m | 50 | 50 |
| | Max. difference in level | m | 25 | 25 |
| Ambient temp. | | ℃ | cooling: 18~43; heating:-7~24 | cooling: 18~43; heating:-7~24 |

**Notes**: 1. Nominal cooling capacities are based on the following conditions:
Indoor temp: 27°CDB, 19°CWB; Outdoor temp: 35°CDB;
2. Nominal heating capacities are based on the following conditions:
Indoor temp: 20°CDB; Outdoor temp: 7°CDB, 6°CWB;
3. Actual noise level may differ, depending on the room structure, etc, since these noise values are from an anechoic room.

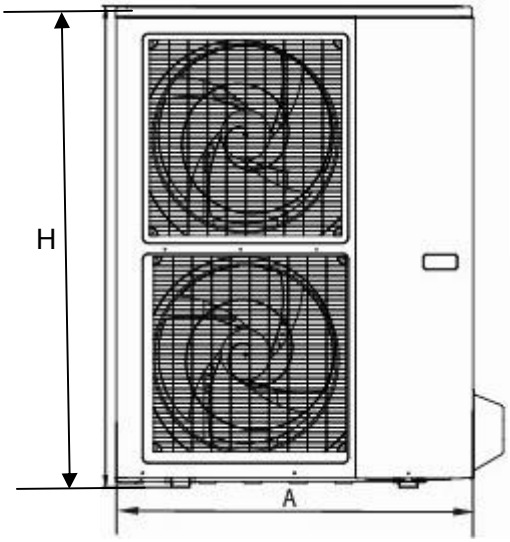
## 2. Dimensions

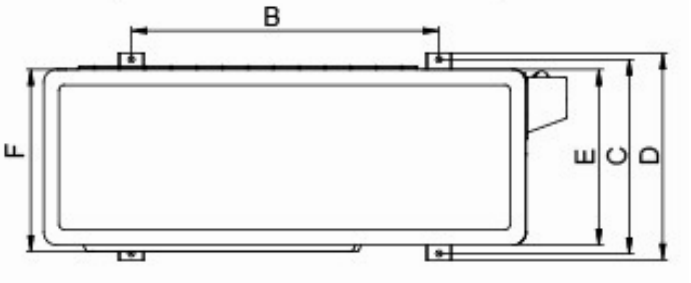


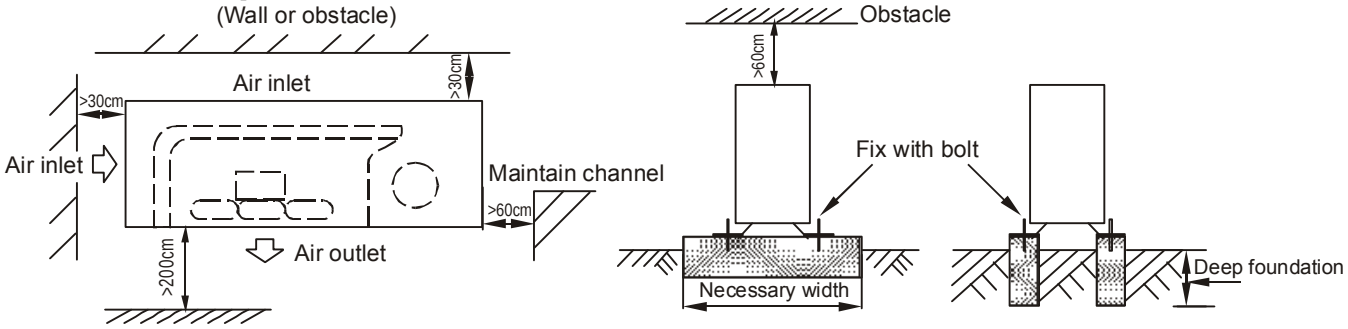

| Model (mm) | A | B | C | D | E | F | H |
|---|---|---|---|---|---|---|---|
| ASE-18AH | 760 | 530 | 290 | 315 | 270 | 285 | 590 |
| ASE-24AH | 842 | 560 | 335 | 360 | 312 | 324 | 695 |
| ASE-36AH | 990 | 624 | 366 | 396 | 340 | 354 | 966 |

| Model(mm) | A | B | C | D | E | F | H |
|---|---|---|---|---|---|---|---|
| ASE-48AH | 900 | 590 | 378 | 400 | 330 | 340 | 1167 |
| ASE-60AH | 900 | 590 | 378 | 400 | 330 | 340 | 1167 |

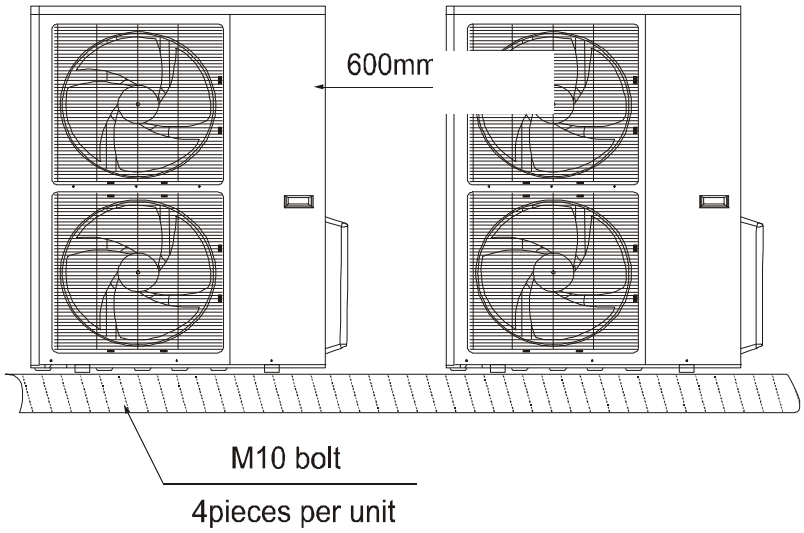


## 3. Service Space

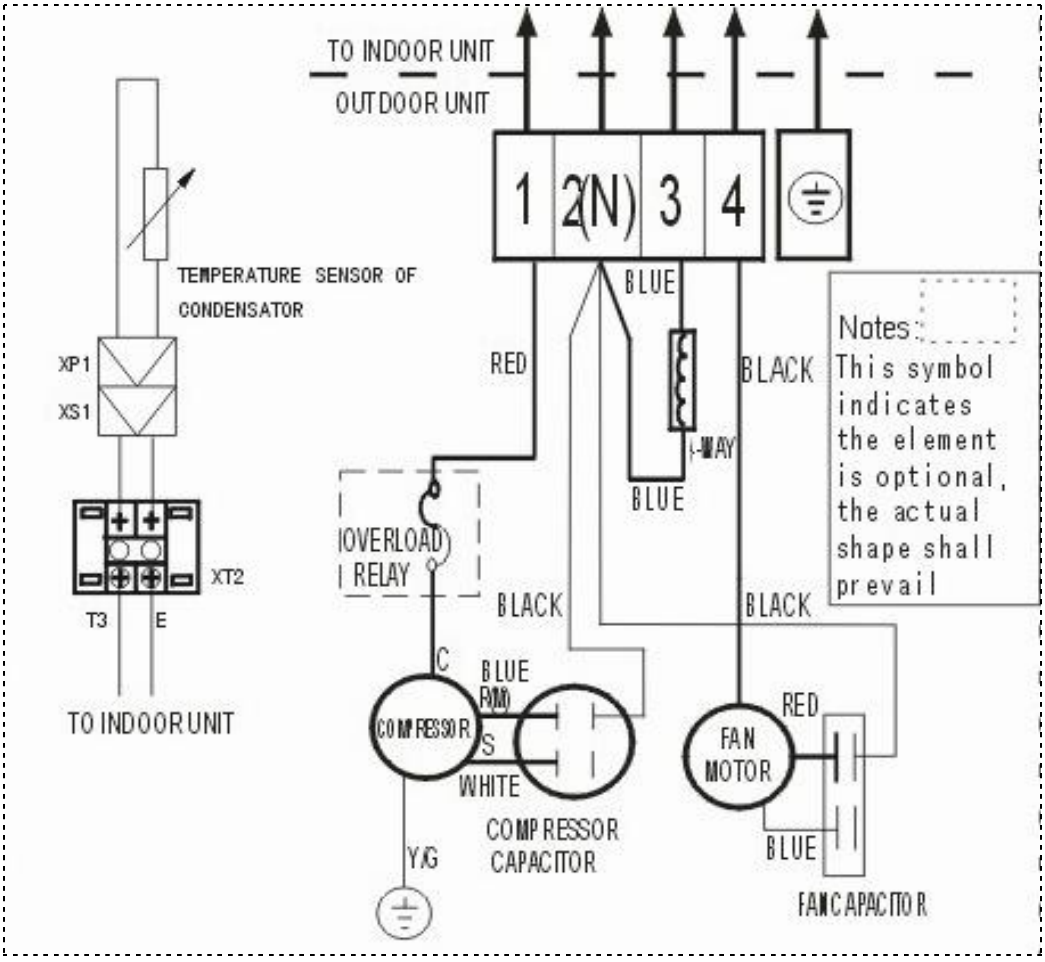



600mm is necessary between 2 outdoor units

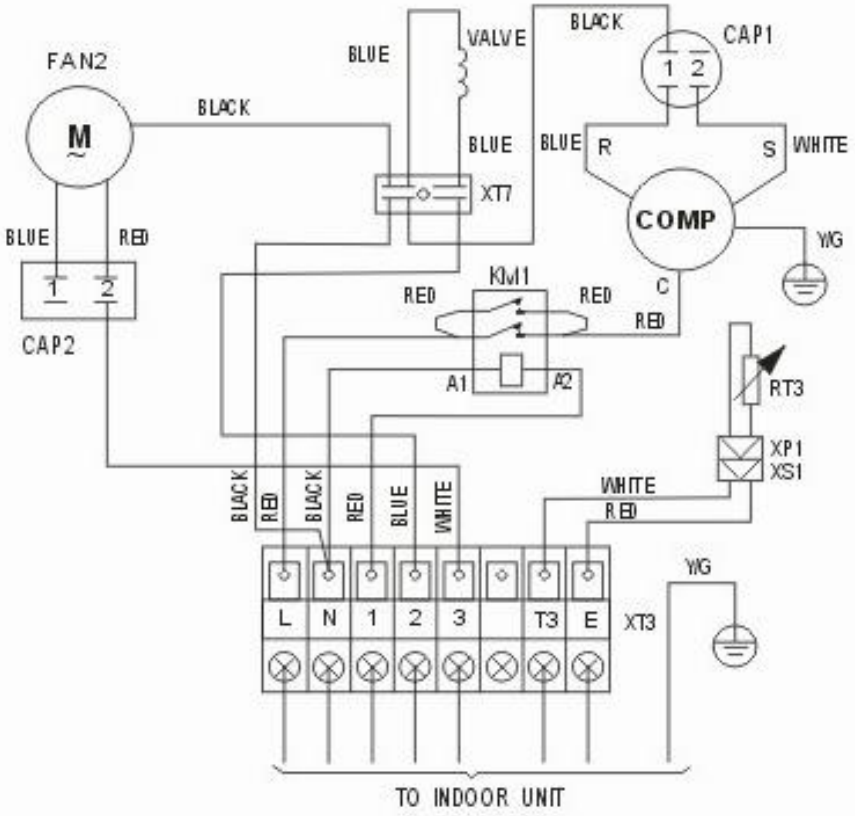


# 4. Wiring Diagrams

## ASE-18AH



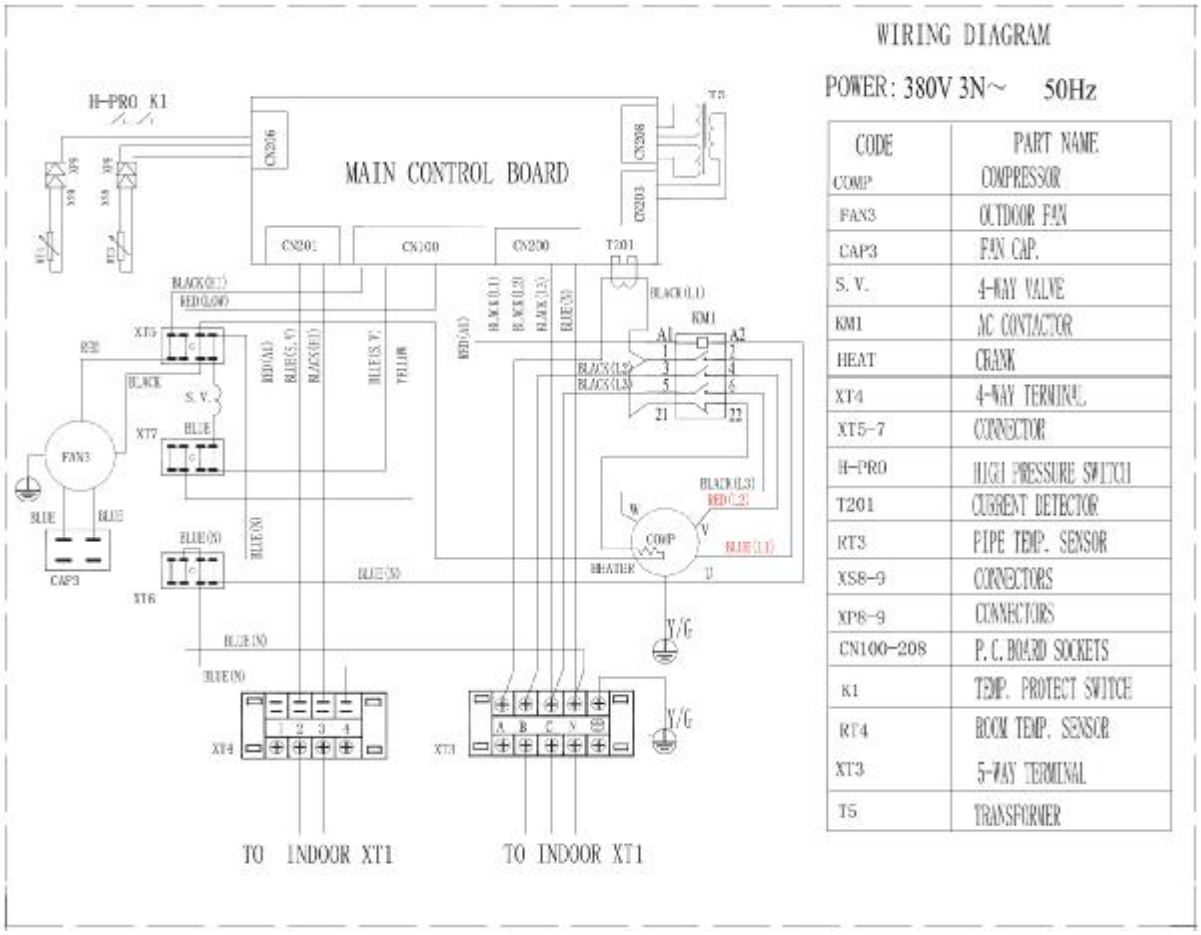
## ASE-24AH




WIRING DIAGRAM
(OUTDOOR UNIT)

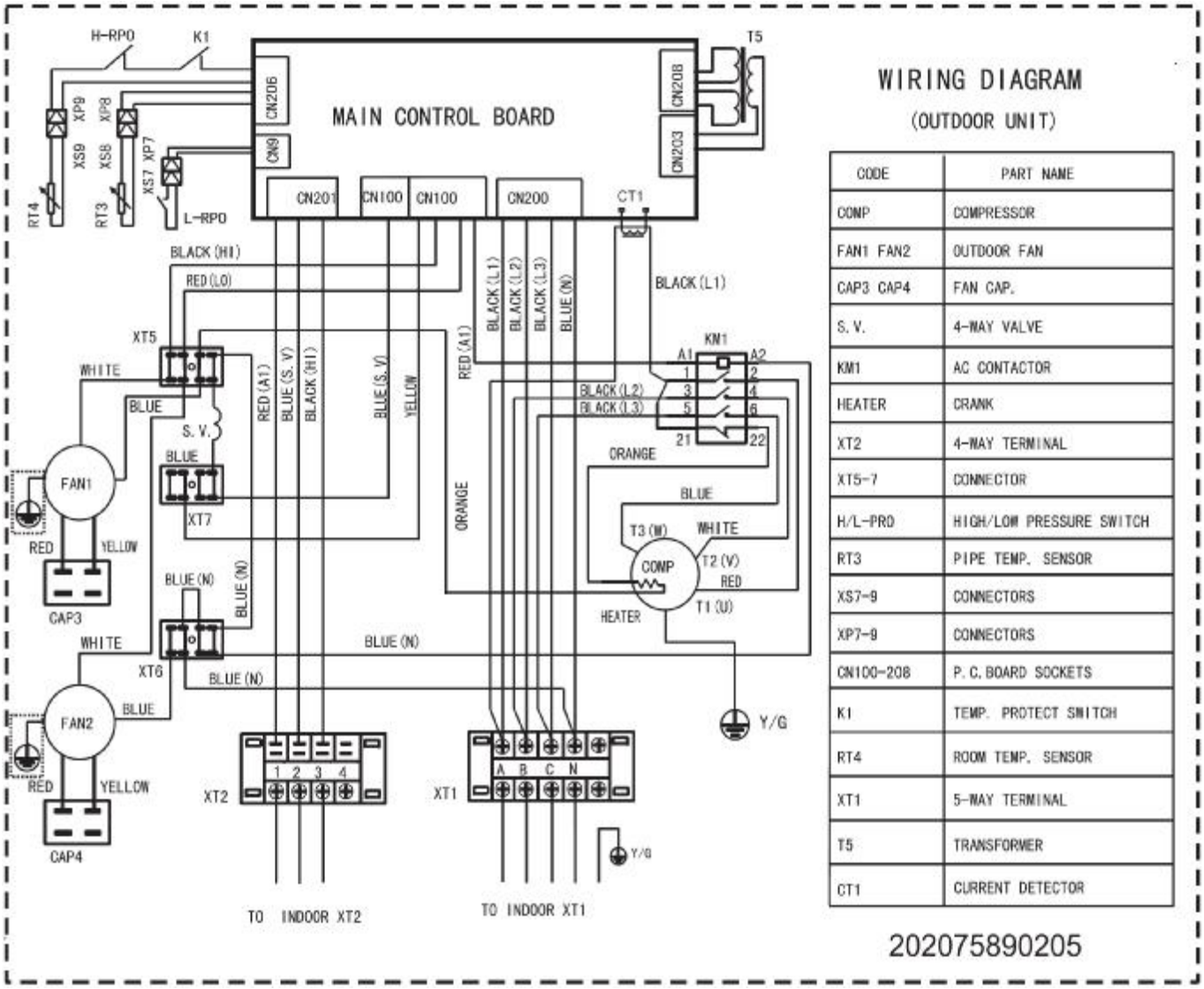
| CODE | PART NAME |
|---|---|
| COMP | COMPRESSOR |
| CAP1 | COMPRESSOR CAPACITOR |
| FAN2 | OUTDOOR FAN |
| CAP2 | OUTDOOR FAN CAPACITOR |
| XT3 | 8-WAY TERMINAL |
| XT7 | MIDDLE TERMINAL |
| VALVE | REVERSING VALVE |
| XP1,XS1 | CONNECTORS |
| RT3 | PPE TEMPERATURE SENSOR |
| KM1 | AC CONTACTOR |

# ASE-36AH




| CODE | PART NAME |
|---|---|
| COMP | COMPRESSOR |
| FAN3 | OUTDOOR FAN |
| CAP3 | FAN CAP. |
| S. V. | 4-WAY VALVE |
| KM1 | AC CONTACTOR |
| HEAT | CRANK |
| XT4 | 4-WAY TERMINAL |
| XT5-7 | CONNECTOR |
| H-PRO | HIGH PRESSURE SWITCH |
| T201 | CURRENT DETECTOR |
| RT3 | PIPE TEMP. SENSOR |
| XS8-9 | CONNECTORS |
| XP8-9 | CONNECTORS |
| CN100-208 | P.C.BOARD SOCKETS |
| K1 | TEMP. PROTECT SWITCH |
| RT4 | ROOM TEMP. SENSOR |
| XT3 | 5-WAY TERMINAL |
| T5 | TRANSFORMER |

## ASE-48AH A S E - 6 0 A H




## WIRING DIAGRAM

(OUTDOOR UNIT)

| CODE | PART NAME |
|---|---|
| COMP | COMPRESSOR |
| FAN1 FAN2 | OUTDOOR FAN |
| CAP3 CAP4 | FAN CAP. |
| S. V. | 4-WAY VALVE |
| KM1 | AC CONTACTOR |
| HEATER | CRANK |
| XT2 | 4-WAY TERMINAL |
| XT5-7 | CONNECTOR |
| H/L-PRO | HIGH/LOW PRESSURE SWITCH |
| RT3 | PIPE TEMP. SENSOR |
| XS7-9 | CONNECTORS |
| XP7-9 | CONNECTORS |
| CN100-208 | P. C. BOARD SOCKETS |
| K1 | TEMP. PROTECT SWITCH |
| RT4 | ROOM TEMP. SENSOR |
| XT1 | 5-WAY TERMINAL |
| T5 | TRANSFORMER |
| CT1 | CURRENT DETECTOR |

202075890205

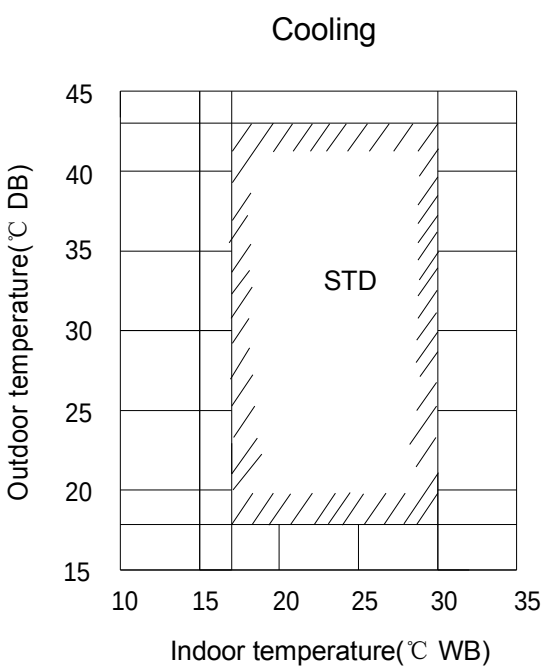
## 5. Electric Characteristics

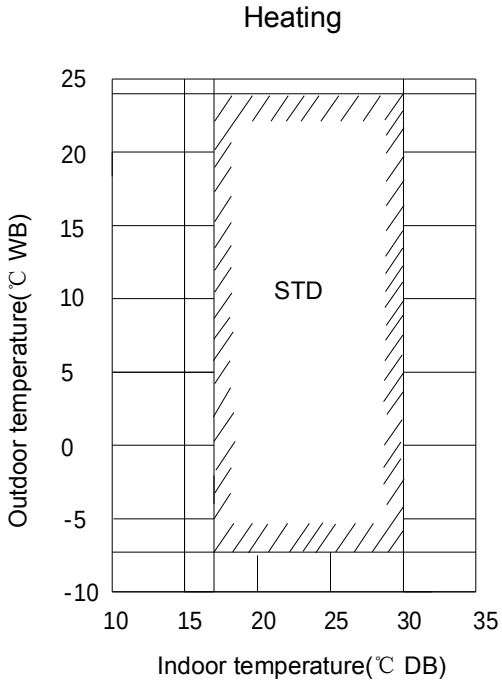
| Model | Outdoor Unit | | | |
|---|---|---|---|---|
| | Hz | Voltage | Min. | Max. |
| ASE-18AH | 50 | 220-240V | 198V | 254V |
| ASE-24AH | 50 | 220-240V | 198V | 254V |
| ASE-36AH | 50 | 380-415V | 342V | 418V |
| ASE-48AH | 50 | 380-415V | 342V | 418V |
| ASE-60AH | 50 | 380-415V | 342V | 418V |

# 6. Operation Limits

| Operation mode | Outdoor temperature(℃) | Room temperature(℃) |
|---|---|---|
| **Cooling & Heating** | | |
| Cooling operation | 18~43 | 17~30 |
| Heating operation | -7~24 | 17~30 |

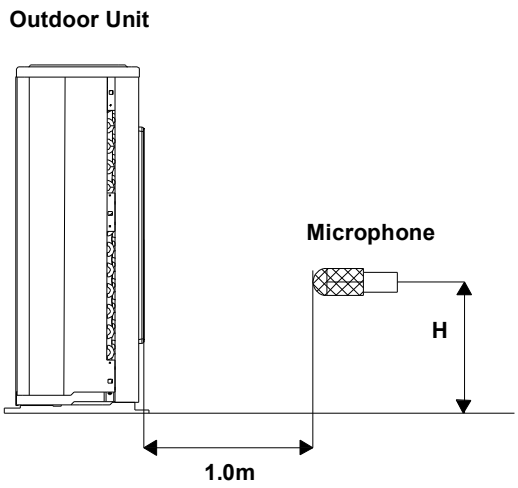
**Cooling & Heating**



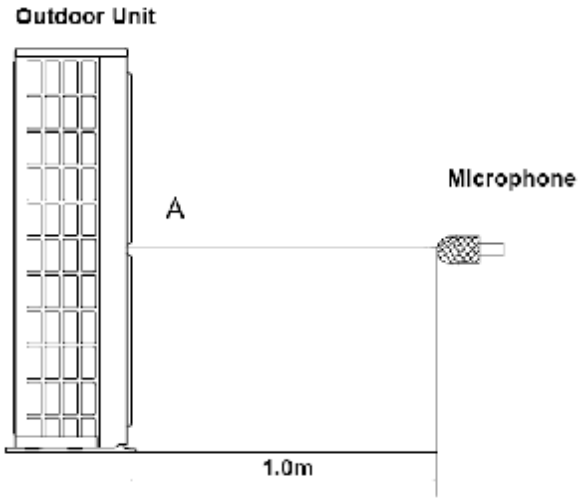
# 7. Sound Levels

**18000Btu/h-48000Btu/h**




**Note:** H= 0.5 × height of outdoor unit

**60000Btu/h**




**Note:** The point A is in the middle of the whole outdoor panel.

| Model | Noise level dB(A) |
|---|---|
| ASE-18AH | 54 |
| ASE-24AH | 55 |
| ASE-36AH (3 phase) | 57 |
| ASE-48AH | 59 |
| ASE-60AH | 59 |

# 8. Troubleshooting

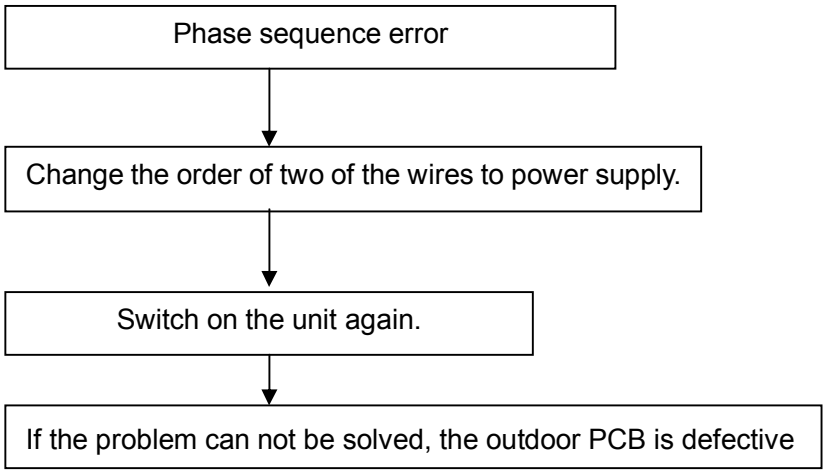
## LEDs' for the indication of outdoor trouble

| Type | Contents | LED1 | LED2 | LED3 |
|---|---|---|---|---|
| Trouble | Phase sequence | Flash | Off | Off |
| Trouble | Lack of phase(A,B) | Flash | Off | Off |
| Trouble | Lack of phase(C) | Off | Off | Off |
| Trouble | Protection of Low pressure | Flash | Flash | Off |
| Trouble | Overload of current | Off | Off | Flash |
| Trouble | Communication malfunction | Flash | Off | Flash |
| Trouble | Open-circuit and short-circuit trouble of T3 | Off | Flash | Flash |
| Trouble | Open-circuit and short-circuit trouble of T4 | Off | Flash | Off |
| Trouble | High temperature protection of condenser | Flash | Flash | Flash |

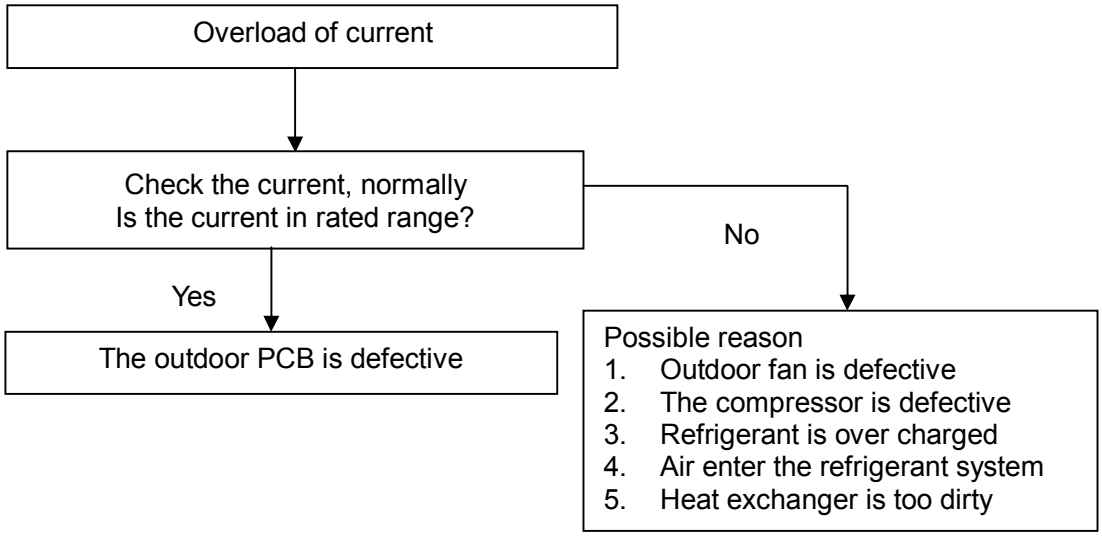
## Note:

1. If the LED1-LED3 are flashing slowly,means the system is stand-by.
2. T3: Outdoor condenser temperature sensor
3. T4: Outdoor ambient temperature sensor

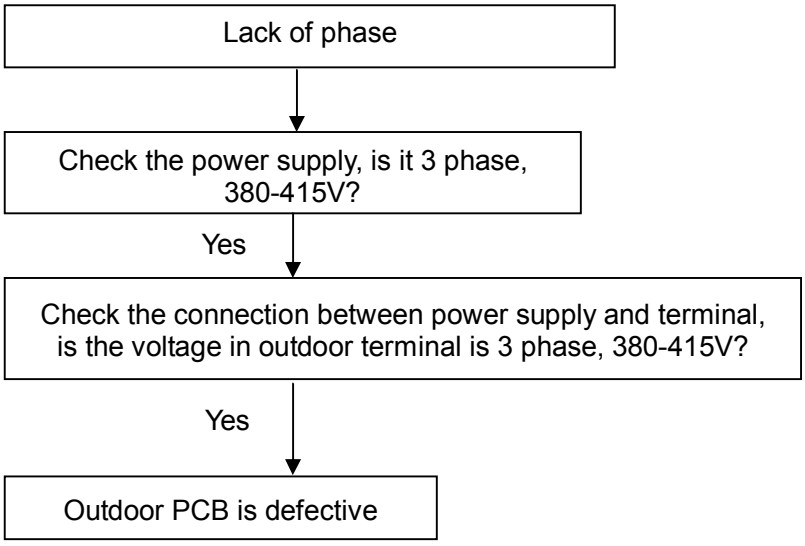
**a. Phase sequence error:**


Phase sequence error
Change the order of two of the wires to power supply.
Switch on the unit again.
If the problem can not be solved, the outdoor PCB is defective

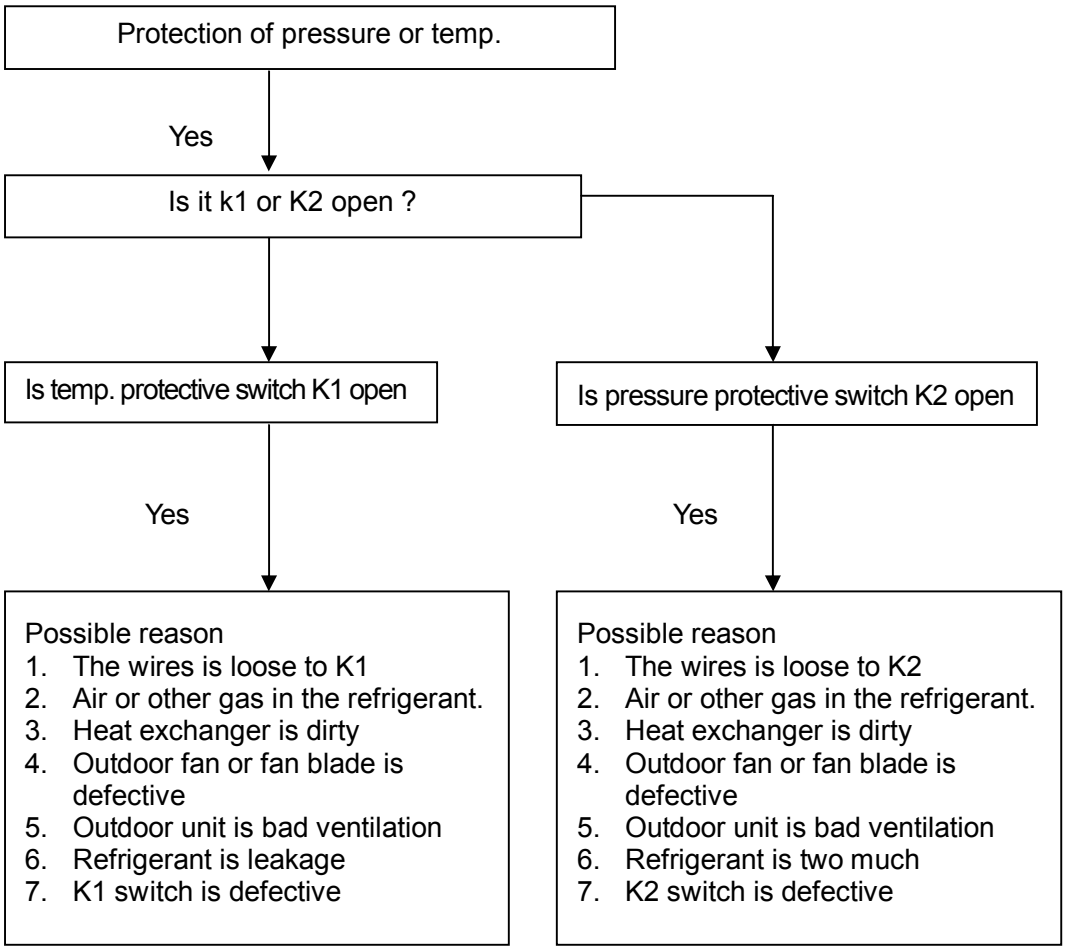
**b. Overload of current**


Overload of current
Check the current, normally
Is the current in rated range?
No
Yes
The outdoor PCB is defective
Possible reason
1. Outdoor fan is defective
2. The compressor is defective
3. Refrigerant is over charged
4. Air enter the refrigerant system
5. Heat exchanger is too dirty

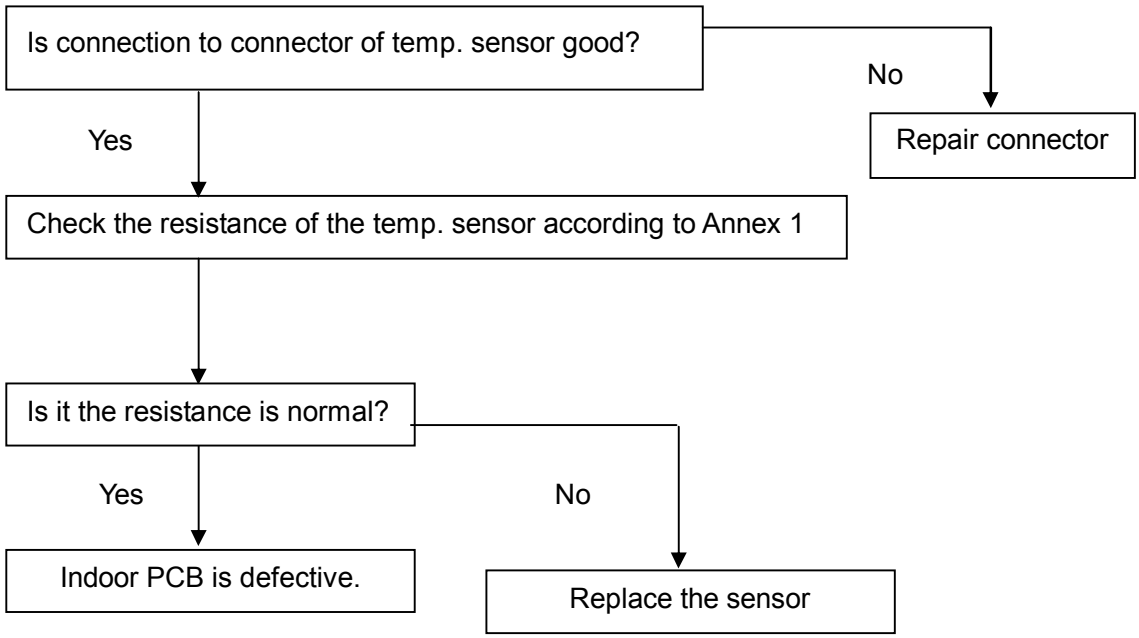
**c. Lack of phase**


Lack of phase
Check the power supply, is it 3 phase,
380-415V?
Yes
Check the connection between power supply and terminal,
is the voltage in outdoor terminal is 3 phase, 380-415V?
Yes
Outdoor PCB is defective

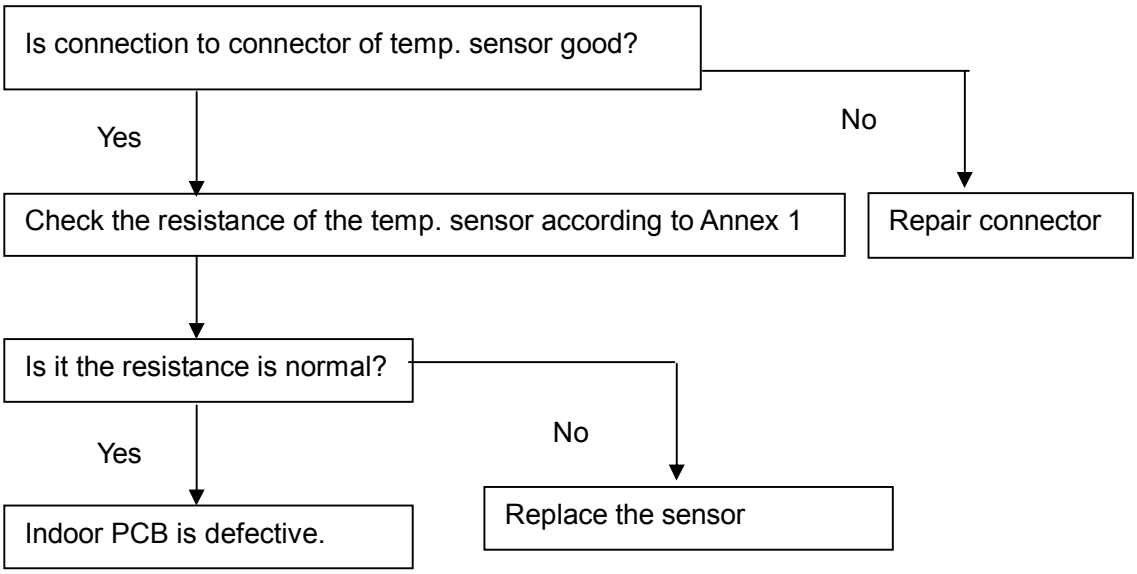
**d. Protection of pressure or temp.**


Protection of pressure or temp.
Yes
Is it k1 or K2 open ?
Is temp. protective switch K1 open
Is pressure protective switch K2 open
Yes
Yes
Possible reason
1. The wires is loose to K1
2. Air or other gas in the refrigerant.
3. Heat exchanger is dirty
4. Outdoor fan or fan blade is defective
5. Outdoor unit is bad ventilation
6. Refrigerant is leakage
7. K1 switch is defective
Possible reason
1. The wires is loose to K2
2. Air or other gas in the refrigerant.
3. Heat exchanger is dirty
4. Outdoor fan or fan blade is defective
5. Outdoor unit is bad ventilation
6. Refrigerant is two much
7. K2 switch is defective

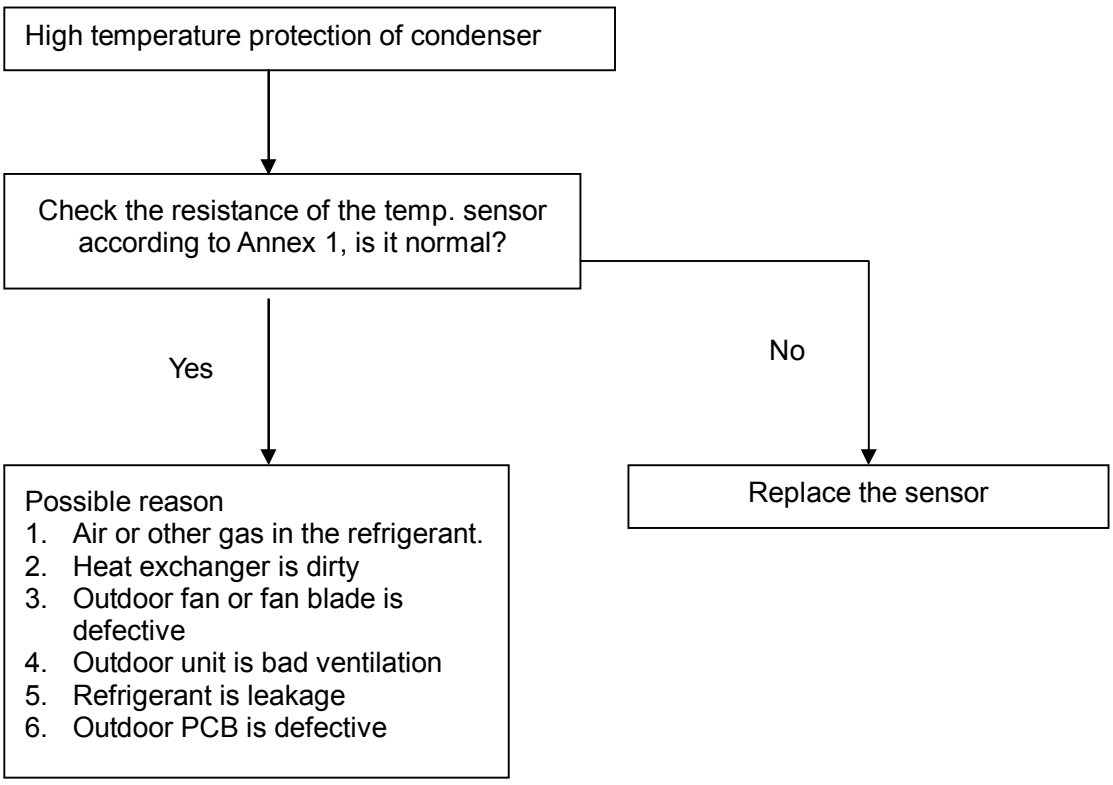
**e. Open-circuit and short-circuit trouble of T3**



**f. Open-circuit and short-circuit trouble of T4**




**g. High temperature protection of condenser**


High temperature protection of condenser
Check the resistance of the temp. sensor according to Annex 1, is it normal?
No
Yes
Replace the sensor
Possible reason
1. Air or other gas in the refrigerant.
2. Heat exchanger is dirty
3. Outdoor fan or fan blade is defective
4. Outdoor unit is bad ventilation
5. Refrigerant is leakage
6. Outdoor PCB is defective

# Installation

1.Precaution on Installation ..... 132

2.Vacuum Dry and Leakage Checking ..... 133

3.Additional Refrigerant Charge ..... 135

4.Water Drainage ..... 136

5.Insulation Work ..... 139

6.Wiring ..... 140

7.Test Operation ..... 141

# 1. Precaution on Installation

1). Measure the necessary length of the connecting pipe, and make it by the following way.

a. Connect the indoor unit at first, then the outdoor unit.

Bend the tubing in proper way. Do not harm them.

*Specially Notice the pipe length/height/dimension of each capacity.*

**Maximum pipe length**

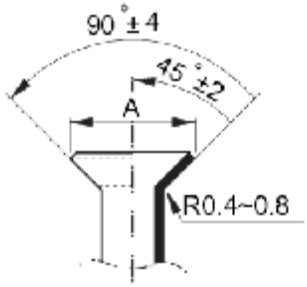
| Model | Max. Length | Max. Elevation |
|---|---|---|
| 12,000Btu/h | 15m | 8m |
| 18,000Btu/h ~30,000Btu/h | 25m | 15m |
| 36,000Btu/h | 30m | 20m |
| 48,000Btu/h~60,000Btu/h | 50m | 25m |

**Piping sizes**

| Model | Liquid(mm) | Gas(mm) |
|---|---|---|
| 12,000Btu/h~18,000Btu/h | 6.4 | 12.7 |
| 24,000Btu/h | 9.5 | 15.9 |
| 30,000Btu/h~60,000Btu/h(Cooling Only) | 9.5 | 15.9 |
| 30,000Btu/h~60,000Btu/h(Cooling & Heating) | 12.7 | 19 |

CAUTIONS

- Daub the surfaces of the flare pipe and the joint nuts with frozen oil, and wrench it for 3~4 rounds
- With hands before fasten the flare nuts.
- Be sure to use two wrenches simultaneously when you connect or disconnect the pipes.

| Pipe gauge | Tightening torque | Flare dimension A Min (mm) Max | | Flare shape |
|---|---|---|---|---|
| Φ6.4 | 15～16N.m (153～163 kgf.cm) | 8.3 | 8.7 |  |
| Φ9.5 | 25～26N.m (255～265kgf.cm) | 12.0 | 12.4 | |
| Φ12.7 | 35～36N.m (357～367kgf.cm) | 15.4 | 15.8 | |
| Φ15.9 | 45～47N.m (459～480 kgf.cm) | 18.6 | 19.1 | |
| Φ19.1 | 65～67N.m (663～684kgf.cm) | 22.9 | 23.3 | |



b. The stop value of the outdoor unit should be closed absolutely (as original state). Every time you connect it, first loosen the nuts at the part of stop value, then connect the flare pipe immediately (in 5 minutes). If the nuts have been loosened for a long time, dusts and other impurities may enter the pipe system and may cause malfunction later. So please expel the air out of the pipe with refrigerant before connection.

c. Expel the air after connecting the refrigerant pipe with the indoor unit and the outdoor unit. Then fasten the nuts at the repair-points.

2) Locate The Pipe

a. Drill a hole in the wall (suitable just for the size of the wall conduit), then set on the fittings such as the wall conduit and its cover.

b. Bind the connecting pipe and the cables together tightly with binding tapes. Do not let air in, which will cause water leakage by condensation.

c. Pass the bound connecting pipe through the wall conduit from outside. Be careful of the pipe allocation to do no damage to the tubing.

3) Connect the pipes.

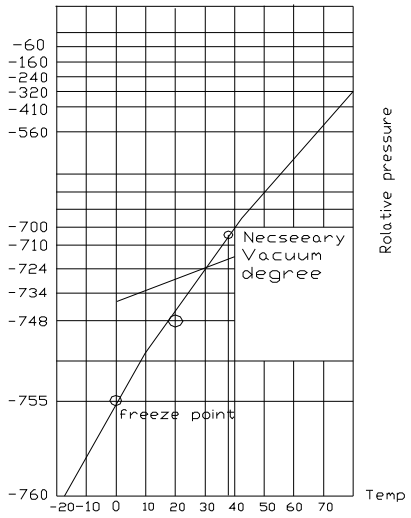
4) Then, open the stem of stop values of the outdoor unit to make the refrigerant pipe connecting the indoor unit with the outdoor unit in fluent flow.

5) Be sure of no leakage by checking it with leak detector or soap water.

6) Cover the joint of the connecting pipe to the indoor unit with the soundproof / insulating sheath (fittings), and bind it well with the tapes to prevent leakage.

# 2. Vacuum Dry and Leakage Checking

2.1 Vacuum Dry: use vacuum pump to change the moisture (liquid) into steam (gas) in the pipe and discharge it out of the pipe to make the pipe dry. Under one atmospheric pressure, the boiling point of water(steam temperature) is 100℃. Use vacuum pump to make the pressure in the pipe near vacuum state, the boiling point of water falls relatively. When it falls under outdoor temperature, the moisture in the pipe will be vaporized.

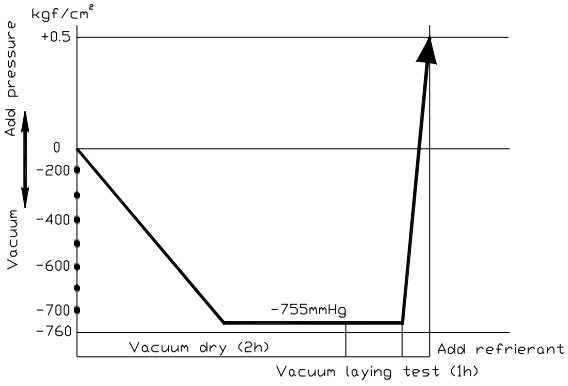



2.2 Vacuum dry procedure

There are two methods of vacuum dry due to different construction environment: common vacuum dry, special vacuum dry.

①. Common vacuum dry procedure

- Vacuum dry (for the first time)---connect the all-purpose detector to the inlet of liquid pipe and gas pipe, and run the vacuum pump more than two hours (the vacuum pump should be below -755mmHg)
- If the pump can't achieve below -755mmHg after pumping 2 hours, moisture or leakage point will still exist in the pipe. At this time, it should be pumped 1 hour more.
- If the pump can't achieve -755mmHg after pumping 3 hours, please check if there are some leakage points.
- Vacuum placement test: place 1 hour when it achieves -755mmHg, pass if the vacuum watch shows no rising. If it rises, it shows there's moisture or leakage point.
- Vacuuming from liquid pipe and gas pipe at the same time.
- Sketch map of common vacuum dry procedure.



②. Special vacuum dry procedure

- This vacuum dry method is used in the following conditions:
- There's moisture when flushing the refrigerant pipe.
- Rainwater may enter into the pipe.
- Vacuum dry for the first time ····· 2h pumping

③. Vacuum destroy for the second time ····· Fill nitrogen to 0.5Kgf/cm$^2$

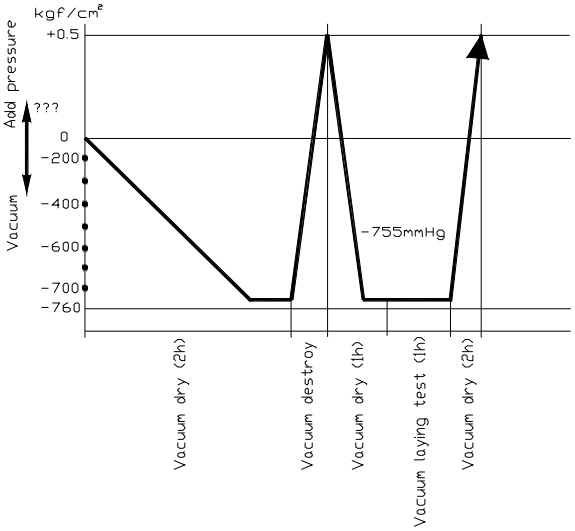
Because nitrogen is for drying gas, it has vacuum drying effect during vacuum destroy. But if the moisture is too much, this method can't dry thoroughly. So, please pay more attention to prevent water entering and forming condensation water.

④. Vacuum dry for the second time·····1h pumping

Determinant: Pass if achieving below -755mmHg. If -755mmHg can't be achieved in 2h, repeat procedure ③ and ④.

⑤. Vacuum placing test ····· 1h

⑥. Sketch map of special vacuum dry procedure



# 3. Additional Refrigerant Charge

**Caution**

● Refrigerant cannot be charged until field wiring has been completed.

● Refrigerant may only be charged after performing the leak test and the vacuum pumping.

● When charging a system, care shall be taken that its maximum permissible charge is never exceeded, in view of the danger of liquid hammer.

● Charging with an unsuitable substance may cause explosions and accidents, so always ensure that the appropriate refrigerant is charged.

● Refrigerant containers shall be opened slowly.

● Always use protective gloves and protect your eyes when charging refrigerant.

The outdoor unit is factory charged with refrigerant. Calculate the added refrigerant according to the diameter and the length of the liquid side pipe of the outdoor unit/indoor unit

| R(g) D(mm) / L(m) | φ6.4 | Φ9.5 | Φ12.7 |
|---|---|---|---|
| Less than 5m (One-way) | — | — | — |
| Added Refrigerant When Over 5m(One-way) | 11g/m×(L-5) | 30g/m×(L-5) | 60g/m×(L-5) |

**Remark:**

R (g): Additional refrigerant to be charged

L (m): The length of the refrigerant pipe (one-way)

D (mm): Liquid side piping diameter

# 4. Water Drainage

## 4.1 Gradient and Supporting

4.1.1 Keep the drainpipe sloping downwards at a gradient of at least 1/100. Keep the drainpipe as short as possible and eliminate the air bubble.

4.1.2 The horizontal drainpipe should be short. When the pipe is too long, a prop stand must be installed to keep the gradient of 1/100 and prevent bending. Refer to the following table for the specification of the prop stand.

| | Diameter | Distance between the prop stands |
|---|---|---|
| Hard PVC pipe | 25~40mm | 1.5~2m |

4.1.3. Precautions

① The diameter of drainpipe should meet the drainage requirement at least.

② The drainpipe should be heat-insulated to prevent atomization.

③ Drainpipe should be installed before installing indoor unit. After powering on, there is some water in water-receiver plate. Please check if the drain pump can operate correctly.

④ All connection should be firm.

⑤ Wipe color on PVC pipe to note connection.

⑥ Climbing, horizontal and bending conditions are prohibited.

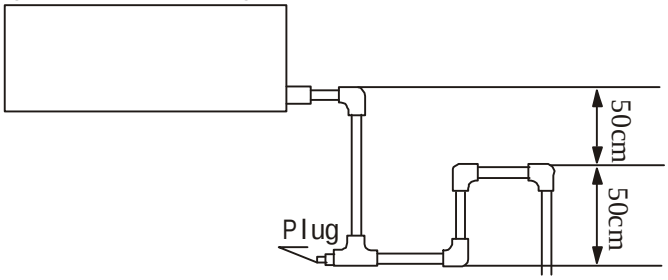
⑦ The dimension of drainpipe can't less than the connecting dimension of indoor drainpipe.

⑧ Heat-insulation should be done well to prevent condensation.

⑨ Indoor units with different drainage type can't share one convergent drainpipe.

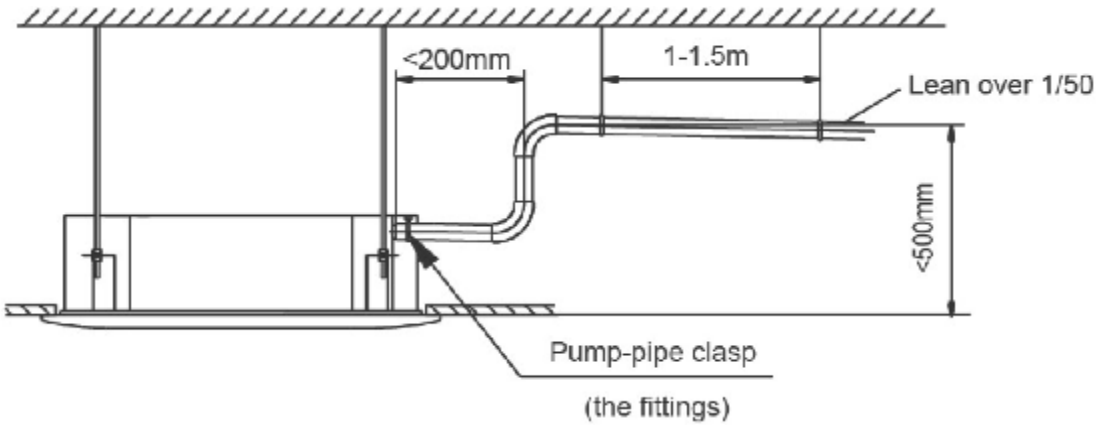
## 4.2 Drainpipe Trap

4.2.1. If the pressure at the connection of the drainpipe is negative, it needs to design drainpipe trap.
4.2.2. Every indoor unit needs one drainpipe trap.
4.2.3. A plug should be designed to do cleaning.

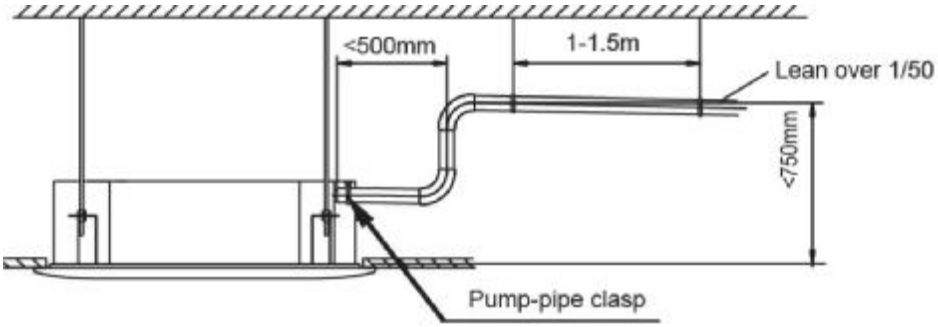



## 4.3 Upwards drainage (drain pump)

**For Four-way cassette(compact)**

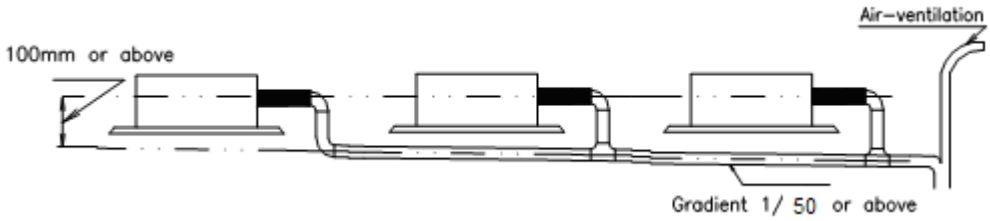


**For Four-way cassette**




## 4.4 Convergent drainage

4.4.1. The number of indoor units should be as small as possible to prevent the traverse main pipe overlong.
4.4.2. Indoor unit with drain pump and indoor unit without drain pump should be in different drainage system.




4.4.3. Selecting the diameter

Number of connecting indoor units→Calculate drainage volume→Select the diameter
Calculate allowed volume =Total cooling capacity of indoor units(HP)×2 (l/ hr)

| | Allowed volume(lean 1/50) (l/ hr) | I.D. (mm) | Thick |
|---|---|---|---|
| Hard PVC | ∽≤14 | ¢25 | 3.0 |
| Hard PVC | 14＜∽≤88 | ¢30 | 3.5 |
| Hard PVC | 88＜∽≤334 | ¢40 | 4.0 |
| Hard PVC | 175＜∽≤334 | ¢50 | 4.5 |
| Hard PVC | 334＜∽ | ¢80 | 6.0 |

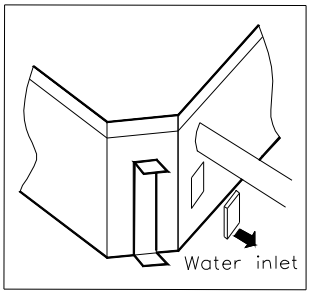
## 4.5 Drainage test

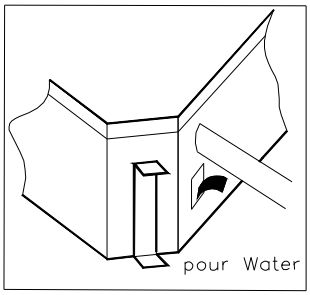
4.5.1Drainage without drain pump

After finishing drainpipe installation, pour some water into the water receiver plate to check if the water flows smoothly.

4.5.2 Drainage with drain pump

① Poke the Water Level Switch, remove the cover, use water pipe to pour 2000ml water into the water receipt plate through the water inlet.




② Turn on the power to Cooling operation. Check the pump's operation and switch on the Water Level Switch. Check the pump's sound and look into the transparent hard pipe in the outlet at the same time to check if the water can discharge normally.

③ Stop the air conditioner running, turn off the power, and put back the cover.

- Stop the air conditioner. After 3 minutes, check if it has abnormity. If the collocation of drainpipes is illogical, the water will flow back overfull, which will cause the alarm lamp flashes, even overflow from the water receipt plate.
- Keep on pouring water until it gives an alarm signal for high water level, check if the pump drains water at once. If the water level can't fall below the alarmed water level after 3 minutes, the air conditioner will stop. Turn off the power and drain the remained water, and then turn on the air conditioner.

Note: the drain stuff in the main water receipt plate is for maintenance. Stuff up the drain stuff to prevent water leakage.

# 5. Insulation Work

## 5.1 Insulation material and thickness

5.1.1. Insulation material

Insulation material should adopt the material which is able to endure the pipe's temperature: no less than 70℃ in the high-pressure side, no less than 120℃ in the low-pressure side(For the cooling type machine, no requirements at the low-pressure side.)

**u** Example: Heat pump type----Heat-resistant Polyethylene foam (withstand above 120℃)
Cooling only type----Polyethylene foam (withstand above 100℃)

5.1.2. Thickness choice for insulation material

Insulation material thickness is as follows:

| | Pipe diameter (mm) | Adiabatic material thickness |
|---|---|---|
| Refrigerant pipe | Φ6.4—Φ25.4 | 10mm |
| | Φ28.6—Φ38.1 | 15mm |
| Drainage pipe | Inner diameterΦ20—Φ32 | 6mm |

## 5.2 Refrigerant pipe insulation

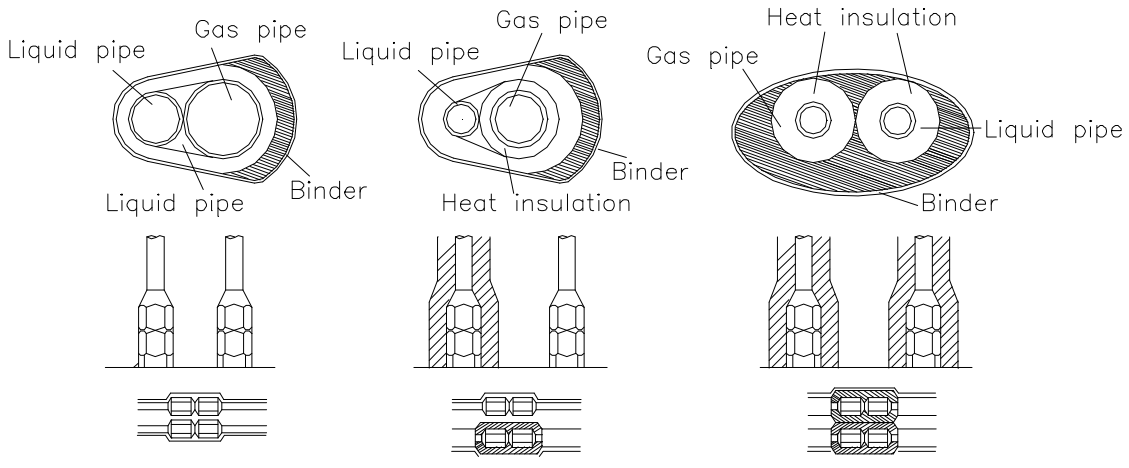
5.2.1. Work Procedure

① Before laying the pipes, the non-jointing parts and non-connection parts should be heat insulated.

② When the gas proof test is eligible, the jointing area, expanding area and the flange area should be heat insulated

5.2.2. Insulation for non-jointing parts and non-connection parts

| wrong | right | |
|---|---|---|
| Gas pipe and liquid pipe should not be put together to insulate | Insulate the gas pipe (cooling only) | Insulate the gas pipe and liquid pipe |

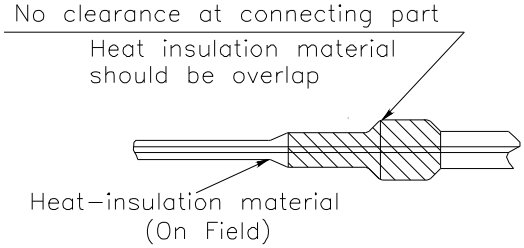


For construction convenience, before laying pipes, use insulation material to insulate the pipes to be deal with, at the same time, at two ends of the pipe, remain some length not to be insulated, in order to be welded and check the leakage after laying the pipes.

5.2.3. Insulate for the jointing area, expanding area and the flange area

① Insulate for the jointing area, expanding area and the flange area should be done after checking leakage of the pipes

② Make sure there's no clearance in the joining part of the accessorial insulation material and local preparative insulation material.




### 5.3 Drainage pipe insulation

The connection part should be insulated, or else water will be condensing at the non-insulation part.

### 5.4 Note

5.4.1 The jointing area, expanding area and the flange area should be heat insulated after passing the pressure test

5.4.2 The gas and liquid pipe should be heat insulated individually, the connecting part should be heat insulated individually.

5.4.3 Use the attached heat-insulation material to insulate the pipe connections (pipes' tie-in ,expand nut ) of the indoor unit

## 6. Wiring

Please refer to the Wiring Diagram.

# 7. Test Operation

**(1) The test operation must be carried out after the entire installation has been completed.**
**(2) Please confirm the following points before the test operation.**

- The indoor unit and outdoor unit are installed properly.
- Tubing and wiring are correctly completed.
- The refrigerant pipe system is leakage-checked.
- The drainage is unimpeded.
- The ground wiring is connected correctly.
- The length of the tubing and the added stow capacity of the refrigerant have been recorded.
- The power voltage fits the rated voltage of the air conditioner.
- There is no obstacle at the outlet and inlet of the outdoor and indoor units.
- The gas-side and liquid-side stop values are both opened.
- The air conditioner is pre-heated by turning on the power.

**(3) According to the user's requirement, install the remote controller when the remote controller's signal can reach the indoor unit smoothly.**
**(4) Test operation**
Set the air conditioner under the mode of "COOLING" with the remote controller, and check the following points.
**Indoor unit**

- Whether the switch on the remote controller works well.
- Whether the buttons on the remote controller works well.
- Whether the air flow louver moves normally.
- Whether the room temperature is adjusted well.
- Whether the indicator lights normally.
- Whether the temporary buttons works well.
- Whether the drainage is normal.
- Whether there is vibration or abnormal noise during operation.

**Outdoor unit**

- Whether there is vibration or abnormal noise during operation.
- Whether the generated wind, noise, or condensed of by the air conditioner have influenced your neighborhood.
- Whether any of the refrigerant is leaked.

PARTS GUIDE

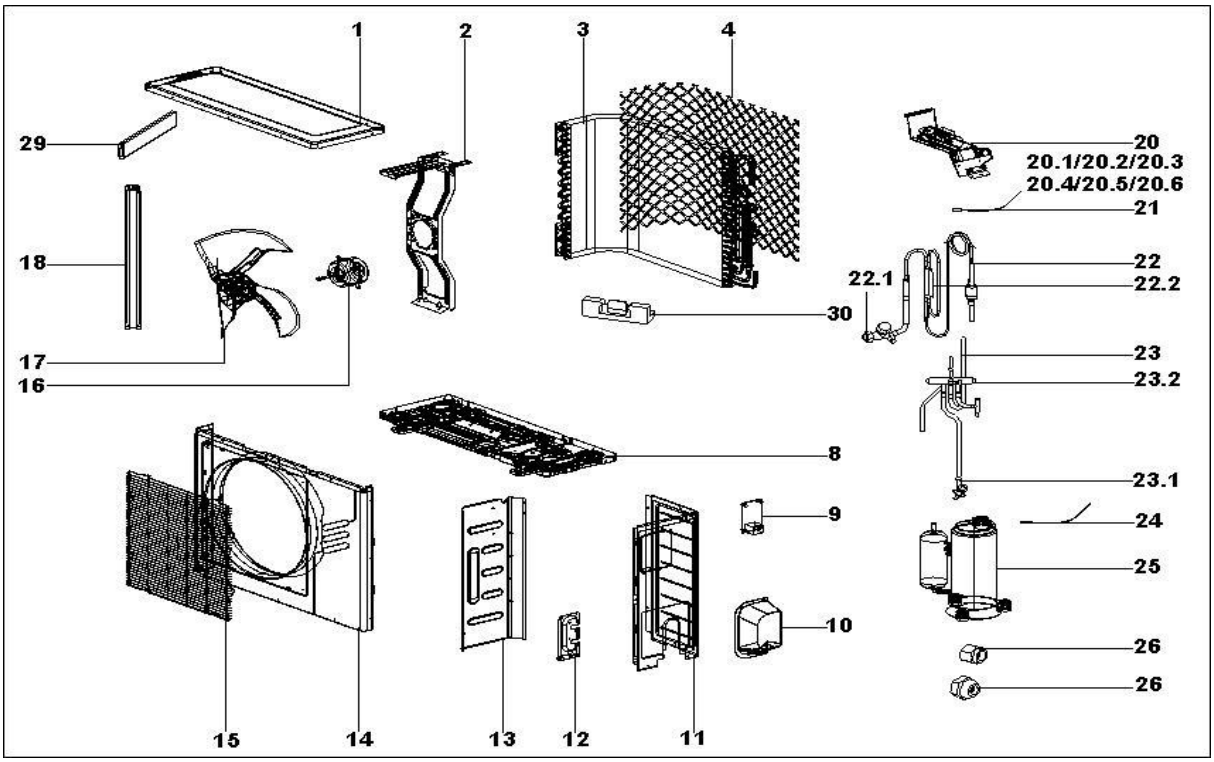
# CONDENSING UNIT

## ASE-18AH, ASE-24AH, ASE-36AH, ASE-48AH, ASE-60AH

sinclair
AIR CONDITIONING

Exploded view

model: ASE-18AH



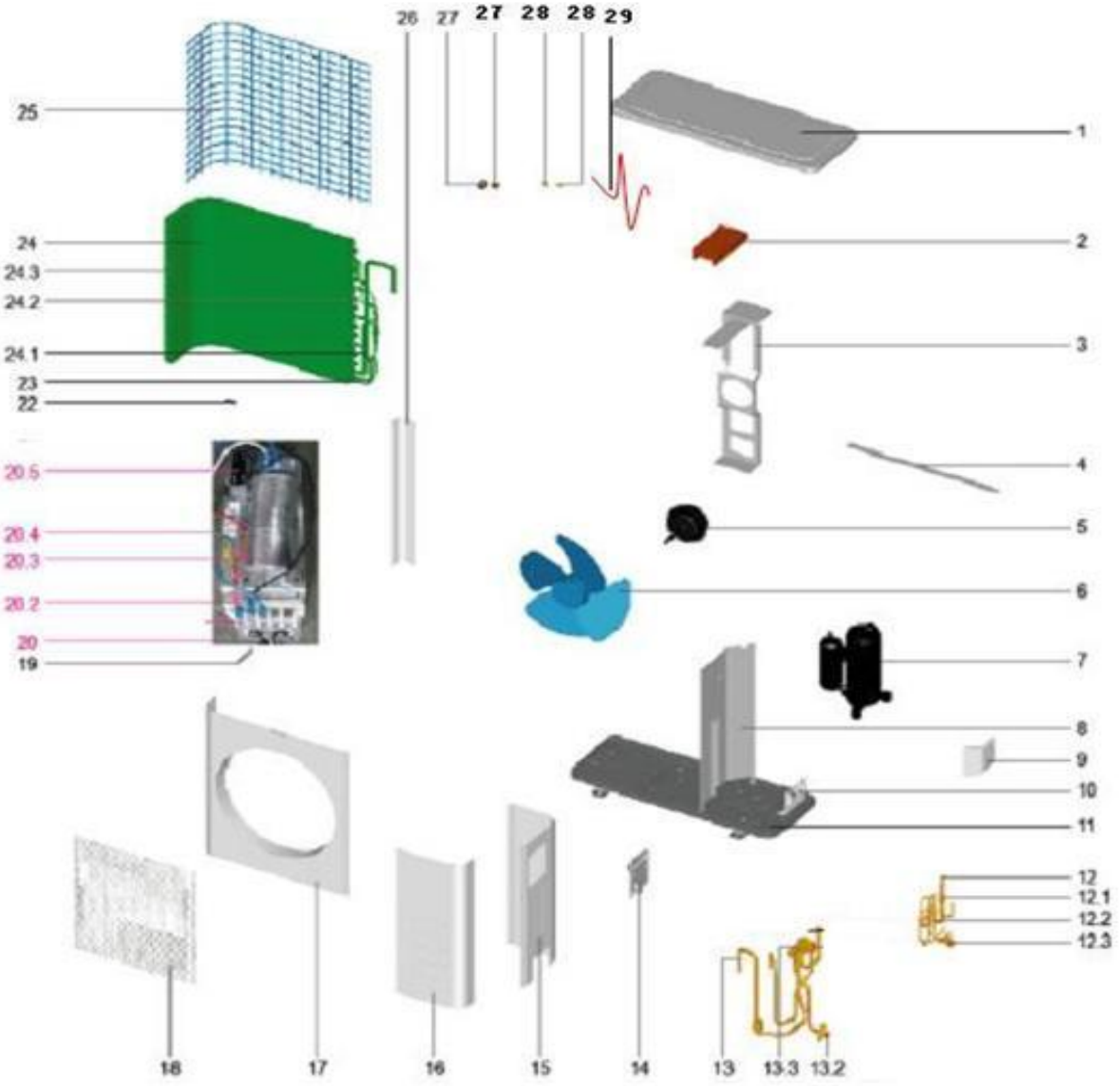
Spare part list

| No | Description | Part Code | Note | Qty | Price Code |
|---|---|---|---|---|---|
| **MODEL: ASE-18AH** | | | | | |
| 1 | Top cover assembly | 201237400324 | | 1 | |
| 2 | Supporter assembly of fan motor | 201237890017 | | 1 | |
| 3 | Condenser assembly | 201537990033 | | 1 | |
| 4 | Rear net | 2011374G0003 | | 1 | |
| 8 | Chassis assembly | 201237890085 | | 1 | |
| 9 | Big handle | 201148100010 | | 1 | |
| 10 | Water collector | 201137400000 | | 1 | |
| 11 | Right clapboard assembly | 201248100239 | | 1 | |
| 12 | Valve plate | 201237200044 | | 1 | |
| 13 | Partition board assembly | 201237890019 | | 1 | |
| 14 | Front panel assembly | 201237890067 | | 1 | |
| 15 | Air outlet grille | 201237890069 | | 1 | |
| 16 | Asynchronous motor | 202400410505 | | 1 | |
| 17 | Axial flow fan | 201100300514 | | 1 | |
| 18 | Left supporter bar | 201237400323 | | 1 | |
| 20 | Electronic control box assembly | 203337890230 | | 1 | |
| 20.1 | Fan motor capacitor | 202401100353 | | 1 | |
| 20.2 | Compressor capacitor | 202401090057 | | 1 | |
| 20.3 | Wire joint | 202301450130 | | 1 | |
| 20.4 | Wire joint,2p | 202301450043 | | 1 | |
| 20.5 | Installation plate of electric parts | 201275290102 | | 1 | |
| 20.6 | Capacitor clip | 201200100002 | | 1 | |
| 21 | Pipe temperature sensor assembly | 202440500004 | | 1 | |
| 22 | Liquid valve assembly | 201637890680 | | 1 | |
| 22.1 | Liquid valve | 201600740523 | | 1 | |
| 22.2 | One way valve | 201600800065 | | 1 | |
| 23 | 4-way valve assembly | 201637890605 | | 1 | |
| 23.1 | Gas valve | 201600720195 | | 1 | |
| 23.2 | 4-way valve | 201600690011 | | 1 | |
| 24 | Compressor wire assembly | 202402220011 | | 1 | |
| 25 | Compressor | 201400620240 | | 1 | |
| 26 | Nut | 201600330003 | | | |
| 26 | Nut | 201600330001 | | | |
| 29 | Small handle | 201157090002 | | 1 | |
| 30 | Clamp of front net | 201135110801 | | 8 | |

**The data are subject to change without notice.**

Exploded view

model:ASE-24AH

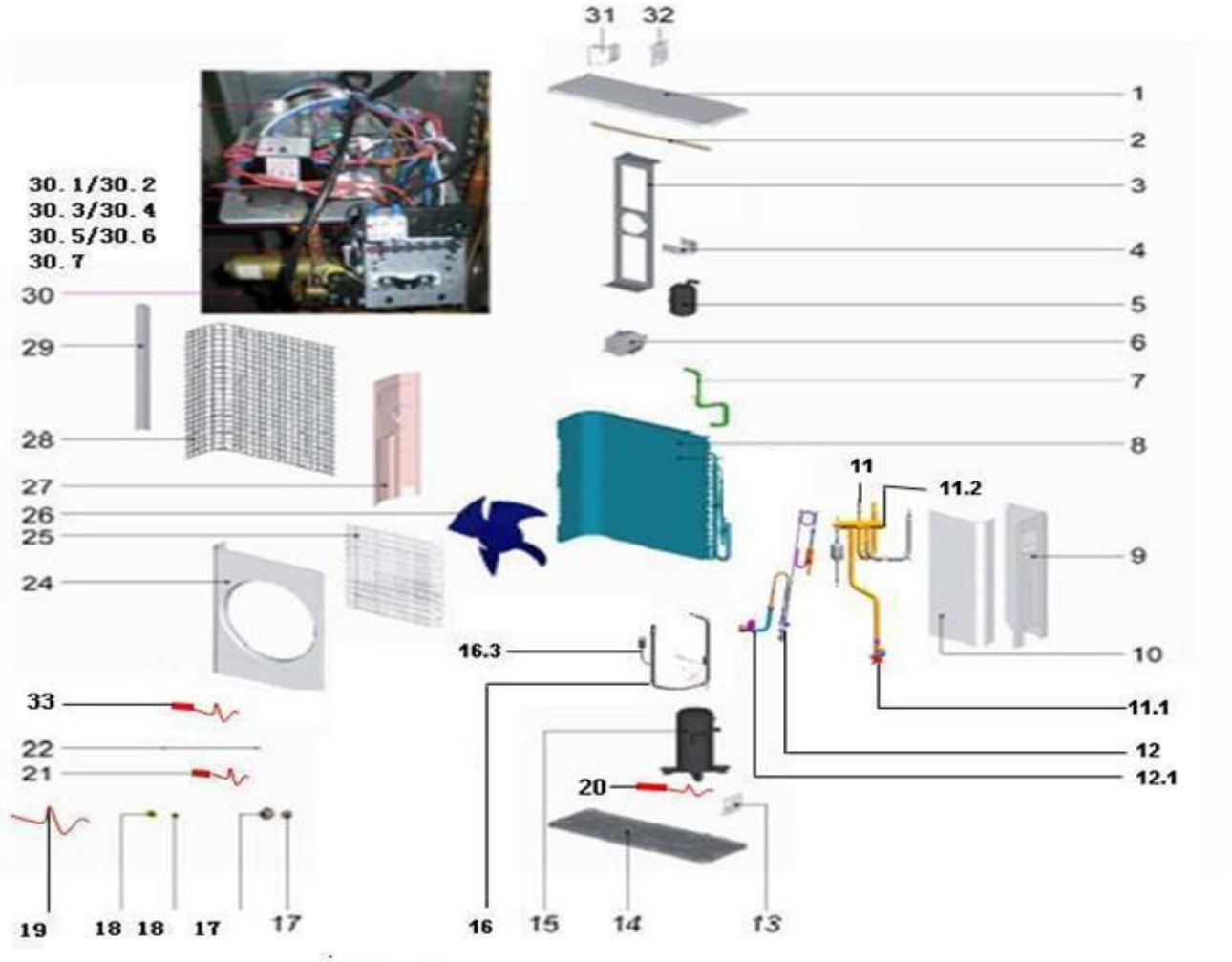


Spare part list

| No | Description | Part Code | Note | Qty | Price Code |
|---|---|---|---|---|---|
| **MODEL: ASE-24AH** | | | | | |
| 1 | Top cover assembly | 201248100266 | | 1 | |
| 2 | Fan motor fixing foam | 202245500001 | | 1 | |
| 3 | Supporter assembly of fan motor | 2012481G0038 | | 1 | |
| 4 | Rear net frame | 201248100076 | | 1 | |
| 5 | Asynchronous motor | 202400430109 | | 1 | |
| 6 | Axial flow fan | 201145500002 | | 1 | |
| 7 | Compressor | 201400620150 | | 1 | |
| 8 | Partition board assembly | 201238090056 | | 1 | |
| 9 | Water collector | 201137390007 | | 1 | |
| 10 | Valve plate | 201237300021 | | 1 | |
| 11 | Chassis assembly | 201248100235 | | 1 | |
| 12 | Liquid valve assembly | 201675390577 | | 1 | |
| 12.1 | Filter | 201637990265 | | 1 | |
| 12.2 | One way valve | 201600800014 | | 1 | |
| 12.3 | Liquid valve | 201600740299 | | 1 | |
| 13 | 4-way valve assembly | 201675390574 | | 1 | |
| 13.2 | Gas valve | 201600720296 | | 1 | |
| 13.3 | 4-way valve | 201600690011 | | 1 | |
| 14 | Big handle assembly | 201148100010 | | 1 | |
| 15 | Rear right clapboard assembly | 201237890063 | | 1 | |
| 16 | Front right clapboard assembly | 201248100234 | | 1 | |
| 17 | Front panel | 201248100236 | | 1 | |
| 18 | Air outlet grille | 201237890022 | | 1 | |
| 19 | Small handle | 201157090002 | | 1 | |
| 20 | Electronic control box assembly | 203375390286 | | 1 | |
| 20.2 | Wire joint | 202301450122 | | 1 | |
| 20.2 | Wire joint | 202301450127 | | 1 | |
| 20.3 | Compressor capacitor | 202401090057 | | 1 | |
| 20.4 | Installation plate of electric parts | 201237900010 | | 1 | |
| 20.5 | Fan motor capacitor | 202401100505 | | 1 | |
| 22 | Clamp of front net | 201135110801 | | 8 | |
| 23 | Pipe temperature sensor assembly | 202440500004 | | 1 | |
| 24 | Condenser assembly | 201537990000 | | 1 | |
| 24.1 | Fluted pipe assembly | 201635490563 | | 1 | |
| 24.2 | Input pipe assembly | 201637990115 | | 1 | |
| 24.3 | Condenser assembly | 201535490089 | | 1 | |
| 25 | Rear net | 2011481G0001 | | 1 | |
| 26 | Left supporter | 201248100228 | | 1 | |
| 27 | Copper nut | 201600320001 | | 1 | |
| 27 | Copper nut | 201600320003 | | 1 | |
| 28 | Sphere pad | 201119900804 | | 1 | |
| 28 | Sphere pad | 201119900802 | | 1 | |
| 29 | Compressor wire assembly | 202402220094 | | 1 | |

**The data are subject to change without notice.**

Exploded view
model:ASE-36AH



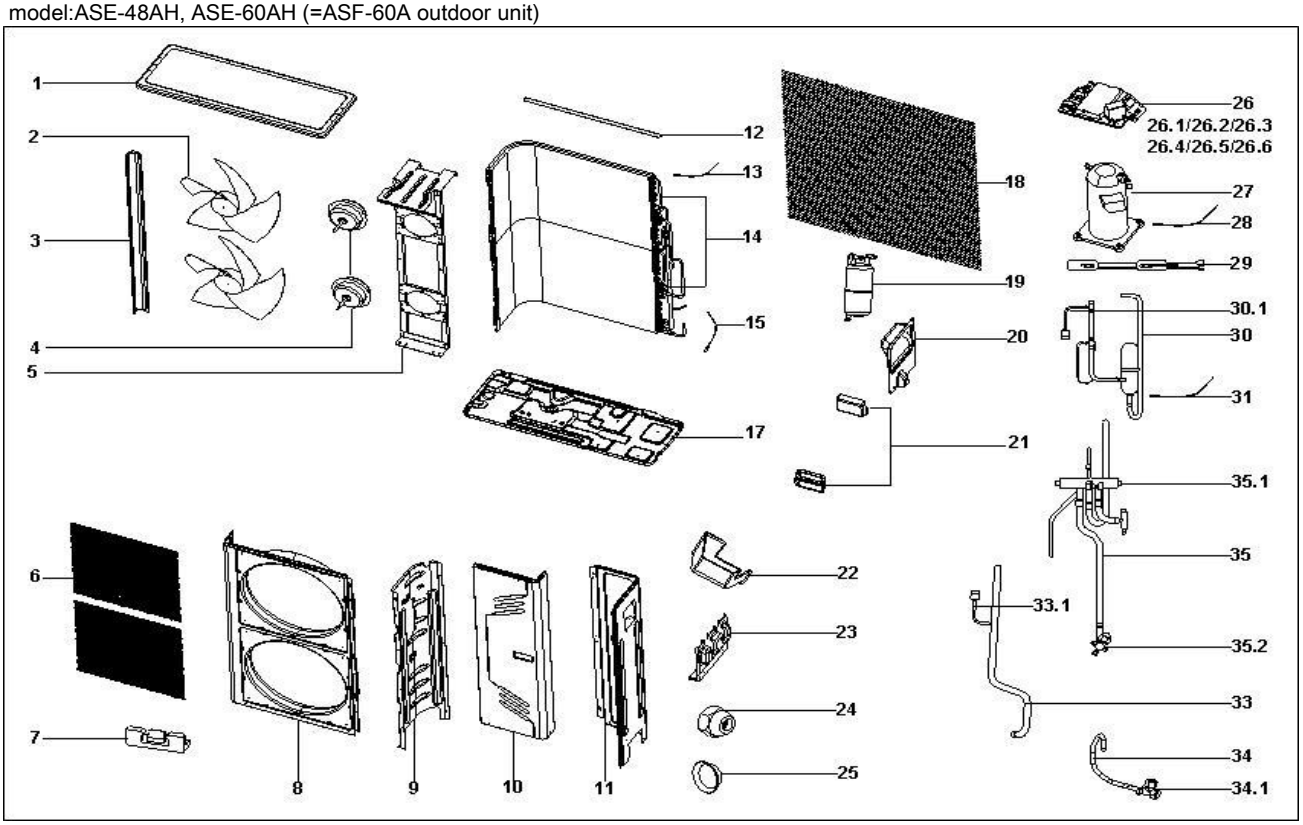
Spare part list

| No | Description | Part Code | Note | Qty | Price Code |
|---|---|---|---|---|---|
| **MODEL: ASE-36AH** | | | | | |
| 1 | Top cover assembly | 201248700174 | | 1 | |
| 2 | Rear supporter | 2012487G0011 | | 1 | |
| 3 | Supporter assembly of fan motor | 201275590200 | | 1 | |
| 4 | Fix clamp of segregator | 201245000901 | | 1 | |
| 5 | Accumulator cylinder | 201601000193 | | 1 | |
| 6 | Asynchronous motor | 202400400582 | | 1 | |
| 7 | Suction pipe | 201648700055 | | 1 | |
| 8 | Condenser assembly | 201575590104 | | 1 | |
| 9 | Rear right clapboard assembly | 201248700171 | | 1 | |
| 10 | Front right clapboard assembly | 201248700056 | | 1 | |
| 11 | 4-way valve assembly | 201675590621 | | 1 | |
| 11.1 | Gas valve | 201600720684 | | 1 | |
| 11.2 | 4-way valve | 201600600124 | | 1 | |
| 12 | Liquid valve assembly | 201675591069 | | 1 | |
| 12.1 | Liquid valve | 201600740704 | | 1 | |
| 13 | Valve plate | 201248790011 | | 1 | |
| 14 | Chassis | 201248700168 | | 1 | |
| 15 | Compressor | 201400710580 | | 1 | |
| 16 | Discharge pipe assembly | 201675591023 | | 1 | |
| 16.3 | Pressure switch | 202301820020 | | 1 | |
| 17 | Copper nut | 201600320004 | | 1 | |
| 17 | Copper nut | 201600320002 | | 1 | |
| 18 | Sphere pad | 201119900803 | | 1 | |
| 18 | Sphere pad | 201119900801 | | 1 | |
| 19 | Compressor wire assembly | 202447590004 | | 1 | |
| 20 | Crankcase electric heater | 202447090021 | | 1 | |
| 21 | Pipe temperature sensor assembly | 202301300111 | | 1 | |
| 22 | Discharge temperature sensor | 202301610024 | | 1 | |
| 24 | Front panel | 201248700072 | | 1 | |
| 25 | Front net assembly | 201248700055 | | 1 | |
| 26 | Axial flow fan | 201100300145 | | 1 | |
| 27 | Partition board assembly | 201248700070 | | 1 | |
| 28 | Rear net | 2011487G0001 | | 1 | |
| 29 | Left supporter | 201248700172 | | 1 | |
| 30 | Electronic control box assembly | 203375590218 | | 1 | |
| 30.1 | Wire joint | 202301450117 | | 3 | |
| 30.1 | Wire joint | 202301450130 | | 1 | |
| 30.1 | Wire joint | 202301450039 | | 1 | |
| 30.2 | Installation plate of electric parts | 201275590077 | | 1 | |
| 30.3 | AC contactor | 202300850046 | | 1 | |
| 30.4 | Terminal board | 201247010643 | | 1 | |
| 30.5 | Main control board assembly | 201375590150 | | 1 | |
| 30.6 | Compressor capacitor | 202401000006 | | 1 | |
| 30.7 | Transformer | 202300900083 | | 1 | |
| 31 | Water collector | 201148790000 | | 1 | |
| 32 | Big handle assembly | 201157390007 | | 1 | |
| 33 | Indoor temperature sensor assembly | 202301300196 | | 1 | |

**The data are subject to change without notice.**

Exploded view

model:ASE-48AH, ASE-60AH (=ASF-60A outdoor unit)



Spare part list

| No | Description | Part Code | Note | Qty | Price Code |
|---|---|---|---|---|---|
| **MODEL: ASE-48AH** | | | | | |
| 1 | Top cover assembly | 201275600087 | | 1 | |
| 2 | Axial flow fan | 201100300102 | | 2 | |
| 3 | Rear-left supporting board | 201275600107 | | 1 | |
| 4 | Asynchronous motor YDK65-6(B) | 202400401180 | | 1 | |
| 4 | Asynchronous motor YDK65-6F(B) | 202400401181 | | 1 | |
| 5 | Supporter assembly of fan motor | 201275600101 | | 1 | |
| 6 | Front net assembly | 201275890056 | | 2 | |
| 7 | Clamp of front net | 201135110801 | | 8 | |
| 8 | Front panel | 201275600105 | | 1 | |
| 9 | Partition board assembly | 201275890038 | | 1 | |
| 10 | Front-right panel assembly | 201275890054 | | 1 | |
| 11 | Rear-right panel | 201275600103 | | 1 | |
| 12 | Rear supporter | 201275600086 | | 1 | |
| 13 | Indoor temperature sensor assembly | 202301300196 | | 1 | |
| 14 | Condenser assembly | 201575790067 | | 1 | |
| 14 | Condenser assembly | 201575790069 | | 1 | |
| 15 | Pipe temperature sensor assembly | 202301300111 | | 1 | |
| 17 | Chassis | 201275600100 | | 1 | |
| 18 | Rear net | 201175600083 | | 1 | |
| 19 | Separator | 201601100059 | | 1 | |
| 20 | Big handle assembly | 201157390007 | | 1 | |
| 21 | Handle | 201148700009 | | 2 | |
| 22 | Water collector | 201148790000 | | 1 | |
| 23 | Valve plate | 201248790011 | | 1 | |
| 24 | Copper nut | 201600320004 | | 1 | |
| 24 | Copper nut | 201600320002 | | 1 | |
| 25 | Sphere pad | 201119900801 | | 1 | |
| 25 | Sphere pad | 201119900803 | | 1 | |
| 26 | Electronic control box assembly | 203375790082 | | 1 | |
| 26.1 | Installation plate of electric parts | 201275600111 | | 1 | |
| 26.2 | Main control board assembly | 201375490007 | | 1 | |
| 26.3 | AC contactor | 202300850045 | | 1 | |
| 26.4 | Transformer | 202300900153 | | 1 | |
| 26.5 | Wire joint | 202301450003 | | 1 | |
| 26.5 | Wire joint | 202301450039 | | 1 | |
| 26.5 | Wire joint | 202301450117 | | 3 | |
| 26.6 | Fan motor capacitor | 202401100354 | | 2 | |
| 27 | Compressor | 201400710570 | | 1 | |
| 28 | Compressor wire assembly | 202445400405 | | 1 | |
| 29 | Crankcase electric heater | 202403100238 | | 1 | |
| 30 | Discharge pipe assembly | 2016757A0102 | | 1 | |
| 30.1 | Pressure switch | 202301820042 | | 1 | |
| 31 | Discharge temperature sensor | 202301610500 | | 1 | |
| 33 | Suction pipe assembly | 2016757A0105 | | 1 | |
| 33.1 | Pressure switch | 202301820021 | | 1 | |
| 34 | Liquid valve assembly | 201675790499 | | 1 | |
| 34.1 | High pressure valve | 201600740519 | | 1 | |
| 35 | Gas valve assembly | 201675790495 | | 1 | |
| 35.1 | 4-way valve | 201600600124 | | 1 | |
| 35.2 | Gas valve | 201600720684 | | 1 | |
| 37 | Condenser connection pipe | 201675790492 | | 1 | |

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